

THE PERFECT MODEL/ENGINE/PROP COMBINATION FOR YOU

# MODEL **Airplane** NEWS

The aircraft of

# TOP GUN

A close-up on  
craftsmanship

page 26



## CHOICES OF THE CHAMPIONS

Engines • Finishes  
Cockpit details • Radio gear



August 2000

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## Model Airplane News and the Zap gang bring you Top Gun 2000

**T**his year's Top Gun Invitational was the 12th annual event brought to you by primary sponsors *Model Airplane News* and Pacer Technology, manufacturer of Zap adhesives. Top Gun 2000 was the most impressive scale invitational yet, and the momentum in terms of technology and scale craftsmanship shows no signs of slowing. We were present in force, cameras blazing, to again bring you the graphic coverage that has helped publicize this event around the world.

This year, Jeff Foley, winner of the coveted title "Mr. Top Gun" for the highest overall score, took first place in Designer Scale with his Me 109E. Terry Nitsch took first in Expert Scale with his Rafale B-01, and Bill McCollie and Ed Berton were first in Team Scale with their Zero M3 Hamp. Notably, 14 turbine-powered jets participated in the competition. See page 26 for the details; and if you've ever wondered what it takes to compete, check out competitor Rich Uravitch's sidebar, "The Road to Top Gun."

### FORMULA FOR SUCCESS

Anyone who has ever wondered which engine and propeller to use with a



*Without sponsors such as Model Airplane News and Pacer Technology, events such as Top Gun would not be possible.*

particular model will appreciate Andy Lennon's article, "The Right Combination," on page 116. In this feature, Andy takes you step by step through the process of matching airframe, engine and propeller for the best possible performance. Choosing the right components to suit your flying style is easier than you may realize.

### BACKYARD FLYERS

Turn your backyard into RC airspace with the Mega Pepper, this month's featured construction project. Reminiscent of many old-time, 3-channel models, this 44-inch-span, Speed-400, low-wing model is inexpensive and easy to build and has surprisingly agile performance. If you'd like to get airborne more quickly, then check out Hobby Lobby's ARF Filip-V glider. Combine this with a simple high-start launch system for effortless, quiet fun. RC flying doesn't get any more convenient than this! ✈



*Because of the tireless efforts of Frank Tiano, Top Gun has set the standard for RC events by always attracting thousands of spectators.*

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100 East Ridge, Ridgefield, CT 06877-4606 USA  
(203) 431-9000 • fax (203) 431-3000  
Email [man@airage.com](mailto:man@airage.com)  
Internet [www.modelairplanenews.com](http://www.modelairplanenews.com)



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# MODEL Airplane NEWS

AUGUST 2000 • VOLUME 128, NUMBER 8



ON THE COVER: main image—Lewis Patton's CAI Grumman Panther comes in for a crosswind landing at this year's Top Gun. Inset photos from Top Gun, left to right—Dave Platt shows off his new Val dive-bomber; Jeff Foley's winning Me-109E takes off; interior detail of Dave Fogarty's Ercoupe; an impressive 1920s-era Sikorsky S-39 amphibian awaits static judging.

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## SHELL SEARCH

I just finished building the Great Planes .40-size Extra 300S. I gave the model a scale red, white and blue "Aero Sport" paint scheme, but I cannot find a decal of the Aeroshell logo that's so important to my model's overall scale appearance. Do you know where I can get one that will fit and stick well? [email]

PAUL CHRISTIANS

Paul, I'm not certain, but I suspect that the .40-size Extra 300S is close to  $\frac{1}{8}$  scale, and a decal of this size should fit your model. Unlimited aerobatic aircraft are now so popular that several companies produce stock and custom "sponsor" decals in both water-slide and vinyl "stick-on" versions. I just built a 30-percent-scale Staudacher that also required the Aeroshell logo. I bought my vinyl decals from Butch Andrews of Model Graphics—(409) 787-2875. Butch supplies all his decals in several scale sizes, and he also makes custom decals on request. Another excellent source of decals is Pro-Mark—(618) 524-2440. GY



## BOOST BOTTLES FOR AIRPLANES?

Chris, I read with great interest your "Airwaves" response regarding boost bottles. My interest is in throttle response in small, mostly  $\frac{1}{2}$ A engines. I very much disagree with you that "slight hesitation" is not a problem in aircraft. I've seen many difficulties with engines sagging on a go-around because the engine was loaded up with fuel. I also disagree that in airplanes, the throttle is applied far less and in a relaxed fashion. Haven't you ever done a stall turn? Hot-dog flying? No slight hesitation here, please.

Could you elaborate on your reference to radical porting, reversion and the spitting-back phenomenon. What timing numbers, crank, exhaust and bypass produce these effects?

Having an adequate exhaust lead has been found to be beneficial. More produces better throttling on just an air-

bleed throttle without the need for the 2-needle stuff. [email]

ANDY

Yes, Andy; having flown for 29 years, I've done countless stall turns, top hats and every other throttle-off maneuver you can think of. Have you ever driven an  $\frac{1}{8}$ -scale car around a winding roadcourse with lots of short straights? Sagging is a far cry from a slight hesitation due to rich low-end mixture and, of course, airplanes need dependable throttle response, but the throttle demands of an RC racecar far exceed the needs of an RC aircraft. The two can't be compared. With a car, you can have the most powerful engine, but if you don't have instantaneous throttle response for those short straights and to come out of turns, you will still lose the race—powerful engine notwithstanding. Yes, in aerobatics you have on and off throttling, but with car racing—except for oval—there's a constant on and off "working" of the throttle somewhere in the mid-range for most of the race.

Reversion occurs with a rotary intake port that has a total open timing of at least 200 to 210 degrees. With the port open this long, you can get reversion (a reverse pulse) back out through the venturi and across the spraybar. The boost bottle is tapped in at the plenum area just below the spraybar. When



these reversionary pulses do come at lower throttle settings, they have somewhere else to go: namely, into the bottle instead of across the spraybar to interfere with low-end mixture continuity. Boost bottles are for radically ported car engines that must have an "on/off" switch-like throttle response. They do nothing for an aircraft engine. I did an entire article on reversion in the "RC Nitro 2000" issue of Radio Control Car Action magazine, our sister publication.

By an "adequate exhaust lead" ("more," as you put it), I assume you mean an exhaust-off-type tube—"more" meaning longer. Yes, this will help idle and throttle response because it raises head temperature. This also means hotter overall running, which is bad! You want to get good throttle response and idle with a good fuel mixture—not higher head temps—and that is done with a good carburetor. True; air-bleed carbs are easier to adjust and are good for the novice, but twin-needle types have much more accurate fuel metering and superior fuel draw. CC

## IGNITION "NOISE"

I am building a P-38 Lightning that has a 104-inch wingspan, and I intend to use two Ryobi 31cc gas engines to power it. I have read several articles that say gas engines can produce radio interference. If this is true, how can I correct this and ensure I don't have any problems? [email]

GIZZMO

Many modelers now use the converted "weed-trimmer" Ryobi gas engine to power their models, and I have not heard of any major problems with radio interference. The basic rules for installing and running any gasoline engine should be followed. Inspect your engine inside and out for any metal shavings or debris left over from the conversion process. Install your engine so it is properly secured to the firewall and, if you prefer, use rubber Iso-mounts to minimize vibration. Always use a resistor spark plug; these plugs are easily identified with an "R" somewhere in the code printed on the plug body. Do not use a metal throttle cable; a plastic Nyrod cable will isolate any ignition "noise" from the throttle servo. Use a proper gas/oil mixture (40:1), and be sure to adjust the carb for a slightly rich fuel-mixture setting. If, after doing all this, you still experience radio interference, you may have to check the ignition/magneto system for loose or broken parts. Replace questionable components or, if you like, replace the stock ignition with an electronic-ignition system; these after-market systems greatly reduce "noise." Hope this helps. GY ✦



**New products or people behind the scenes;** my sources have been put on alert to get the scoop! In this column you'll find new things that will at times cause consternation, and telepathic insults will probably be launched in my general direction! But who cares? It's you the reader who matters most! I spy for those who fly!

**AIR SCOOP**  
BY CHRIS CHIANELLI



## Two Classics

FROM KYOSHO

This Messerschmitt and de Havilland are the latest additions to Kyosho's Super Quality Warbird Series line of ARFs. Both feature all-balsa fuselages and all-balsa wing construction. The Bf109E is precovered in a realistic camouflage trim scheme; the DH82 Tiger Moth features factory-applied, cloth-processed film covering with authentic textures. Both feature gelcoat fiberglass prepainted cowls. Fixed landing gear is included with both, and optional retracts are available for the 109. Both models include wheels, linkages, engine mount, fuel tank and more.

The Bf109's specs are: wingspan—56 inches; wing area—527 square inches; weight—5.7 to 6.2 pounds; wing loading—24.6 to 26.8

ounces per square foot; length—47.6 inches; engine requirements—.40 to .46 2-stroke, or .48 to .53 4-stroke. Specs for the Tiger Moth are: wingspan—54 inches; wing area—899 square inches; weight—6.2 pounds; wing loading—16 ounces per square foot; length—44 inches; engine requirements—.40 to .46 2-stroke, or .48 to .53 4-stroke.

Great Planes Model Distributors, P.O. Box 9021, Champaign, IL 61826-9021; (800) 682-8948; fax (217) 398-0008;

[www.greatplanes.com](http://www.greatplanes.com).



### Clancy's creative sting

Clancy Aviation's press release on this new Bee reads, "How about a rugged biplane that's quick to build and easy to fly? And one that can be set up to perform as gently as the most docile trainer, or as radically as the wildest Fun-Fly plane ... interested?" You bet I'm interested, and many other modelers will be, too. Andy Clancy invented the "Bee" phenomenon and, though others have copied it, it's this kind of creativity that has kept him the unrivaled "king of all Bee-dom."

The Stagger Bee is an all-wooden kit that can be powered as an indoor electric or an all-out stunt machine with a Saito .30 4-stroke. The model can be set up with either three channels or with a fourth channel for the optional "wingerons" upgrade kit.

## Stagger Bee

It's rumored that floats are in the works.

It's Clancy's first biplane, and Andy comments about the amazingly versatile Stagger Bee, "It's by far the best plane I've ever developed; the easiest to fly, yet wildly maneuverable. I'm really excited about this one." We're excited, too, because it's a design that's docile, highly aerobatic, can be flown in small areas and has scale appeal.

Thanks, Andy, from all of us fun-loving modelers. Specs: wingspan (top/bottom)—29.5/25.5 inches; chord—10 inches; total wing area—470 square inches; length—30 inches; weight—18 to 36 ounces; power requirements—.061 to .20 2-stroke, .20 to .30 4-stroke, or Speed 400 to Turbo 10 electric.

Clancy Aviation, P.O. Box 4125, Mesa, AZ 85211-4125; (602) 649-1534; fax (602) 649-9040.





# Silky Wind

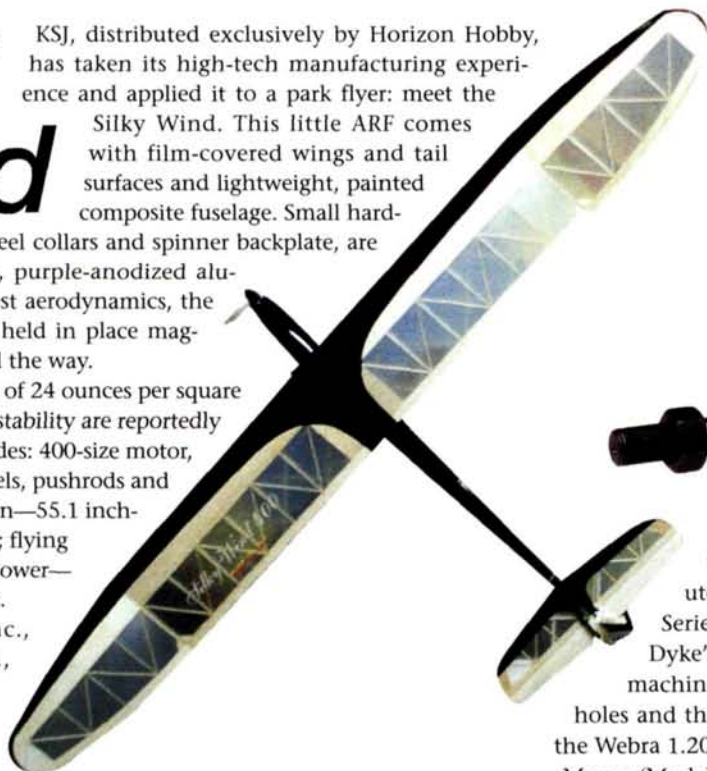
KSJ, distributed exclusively by Horizon Hobby, has taken its high-tech manufacturing experience and applied it to a park flyer: meet the

Silky Wind. This little ARF comes with film-covered wings and tail surfaces and lightweight, painted composite fuselage. Small hard-

ware parts, such as wheel collars and spinner backplate, are made from machined, purple-anodized aluminum. For the cleanest aerodynamics, the radio's access hatch is held in place magnetically—high-tech all the way.

With a wing loading of 24 ounces per square foot, performance and stability are reportedly excellent. The kit includes: 400-size motor, propeller, spinner, wheels, pushrods and clevises. Specs: wingspan—55.1 inches; length—32.7 inches; flying weight—19.5 ounces; power—direct-drive 400 electric.

Horizon Hobby Inc.,  
4105 Fieldstone Rd.,  
Champaign, IL 61822;  
(217) 355-9511;  
www.horizonhobby.com.



The latest addition to the GMS line of engines, distributed by Mecoa, is this new 2000

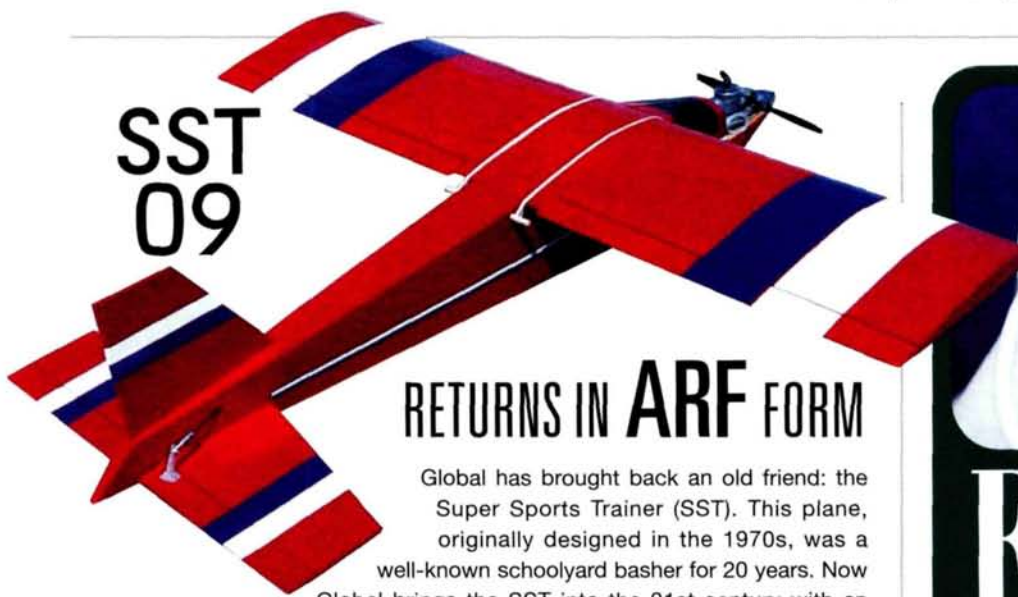
**GMS 1.20**

Series 1.20. Its features include a

Dyke's ring, hardened steel liner and twin-needle, machined-aluminum carb. Both the mounting-lug holes and the muffler-mounting pattern are the same as the Webra 1.20's. The price is a notable \$169.99.

Mecoa (Model Engine Co. of America), P.O. Box 98, Sierra Madre, CA 91025; (800) FLY MY RC; www.mecoa.com.

**SST 09**



## RETURNS IN ARF FORM

Global has brought back an old friend: the Super Sports Trainer (SST). This plane, originally designed in the 1970s, was a well-known schoolyard basher for 20 years. Now

Global brings the SST into the 21st century with an ARF version built around the AP 09. Rumor has it that this little plane, with its wide flight speed range, is a ball to fly. Under power, it's fast and very agile, and at low throttle, it's stable and slow.

The SST ARF is of all-wooden construction, uses iron-on covering and comes with all the necessary hardware. It's also suitable for electric power. With a Multiplex 450 motor and 8 cells (using radio micro equipment), the plane's wing loading comes in under 14 ounces per square foot.

Specs: wingspan—35 inches; wing area—275 square inches; engine requirements—.09 to .15 2-stroke; radio requirements—3-channel w/mini aileron servo.

Global Hobby Distributors, 18480 Bandilier Cir., Fountain Valley, CA 92728-8610; (714) 964-0287; fax (714) 962-6452.



For me, a crank pump mounted directly on top of the fuel container is the ultimate in simplicity and convenience. (Having the crank mechanism attached to a huge field box can be a royal pain in the you-know-what.) The M1 features

**SLIMLINE M1**

a rigid mount for positive operation and a CNC-machined O-ring

cap that prevents spillage and keeps expensive glow fuel sealed and fresh. The M1 is a complete fueling system that includes an aluminum O-ring cap, mounting bracket, 3/32-inch Silicon tubing and all hardware.

Slimline Mfg., P.O. Box 3295, Scottsdale, AZ 85271; (602) 967-5053; fax (602) 967-5030.





## MULTIPLEX Profi mc 4000

The Multiplex Profi mc 4000 incorporates some features I've never seen before in a radio. The 9- to 12-channel modular design is compatible with any brand of PPM FM receiver and has up to 100 model memories, each with five flight modes. There are five count-down/count-up timers, a lap timer with 99 separate memories and—believe it or not—with its optional Co-Pilot module, the 4000 can actually speak to you. Suppose you want to share your latest hot setup with one of your flying buddies; now you can email the settings to him to download and try.

Multiplex USA, 14751 Calvert St., Van Nuys, CA 91411; (818) 785-2401; fax (818) 785-3946; [www.multiplexrc.com](http://www.multiplexrc.com).



## 1/2A Starter

Here's a quick look at Lite Machines' new Micro-Starter that's specifically designed for engines ranging in size from .020 to .074. This little starter features a 15A switch and has an operating range of from 10,000 to 15,000 rpm.

Lite Machines, 1921 Cumberland Ave., Unit H, West Lafayette, IN 47906; (765) 463-0959; fax (765) 463-7004.



**D**esigned to give more performance than is usually expected from an electric heli, JR's new Voyager E features a single axle through the head with CCPM inputs that Horizon, the distributor, claims will give powerful cyclic and collective response. An autorotation clutch and cog-toothed, tail-rotor belt-drive is standard, as are prefinished and balanced main and tail-rotor blades. For increased ruggedness, the main frame is constructed of fiber-filled nylon, and the canopy is blow-molded of polypropylene. Its 12-turn modified motor and optional, 7-cell, 2000mAh pack make possible four minutes of loops and rolls followed by 30 seconds of gentle flight. The inclusion of nylon servo inserts means both standard and miniservos can be used. Voyager comes with JR's NEA-300H speed controller.

Horizon Hobby Inc., 4105 Fieldstone Rd., Champaign, IL 61822; (217) 355-9511; [www.horizonhobby.com](http://www.horizonhobby.com).



## Skylane 182 ARF

Great Planes has introduced this Cessna 182 Skylane that features kit-like, all-wooden construction and Top Flite MonoKote covering. The 182 is well detailed and features prepainted fiberglass cowl, wheel pants, wingtips and tail cone. The wing struts are airfoil-shaped and have "boots" at each end to provide aerodynamically smooth fairing at wing and fuselage junctures. Specs: wingspan—63 inches; wing area—474 square inches; weight—6 pounds; wing loading—29.2 ounces per square foot; length—48 inches; engine requirements—.40 to .51 2-stroke, or .52 to .80 4-stroke.

Great Planes Model Distributors, P.O. Box 9021, Champaign, IL 61826-9021; (800) 682-8948; fax (217) 398-0008; [www.greatplanes.com](http://www.greatplanes.com).



## The New Kolb Aircraft Firefly

How cool is this?—an airplane that you get to ride in when you've finished the kit! The folks at The New Kolb Aircraft Co. think that flying an ultralight should be safe, fun and affordable, and they offer a variety of "models." The Firefly is a 19.5-foot-span, FAA-legal ultralight that's constructed of 4130 chromoly steel that folds for easy storage. You can purchase the plane in various stages of completion and with various options. The Firefly takes off in just 150 feet. At a cruise speed of 63mph, even I could get to work on time.

The New Kolb Aircraft Co., 8375 Russell Dyche Hwy., London, KY 40741; (606) 862-9692; fax (606) 862-9622; [www.tnkolbaircraft.com](http://www.tnkolbaircraft.com). ✦



# PILOT PROJECTS

*A look at what our readers are doing*



## A SCALE FLAIR

John Elliott of McLean, VA, built this 1/6-scale Fokker D-VII from the English Flair kit that he got through Hobby Supply South. The scale color covering is from Arizona Model Aircrafters. John says that the O.S. 70 powered warbird "flies like a real pussycat—it won't stall!"



## SOARING WITH EAGLES

This beautiful Christen Eagle II is the work of Don Larson from Palmdale, CA. The photo, taken by Richard Gustafson, nicely captures the colors of the scale aerobat. The 83-inch biplane weighs 28 pounds, and it has a Brison 4.8ci engine for power; Don uses a Futaba 6-channel PCM radio system for control.



## SEND IN YOUR SNAPSHOTS.

**Model Airplane News** is your magazine and, as always, we encourage reader participation. In "Pilot Projects," we feature pictures from you—our readers. Both color slides and color prints are acceptable. We receive so many photographs that we are unable to return them.

All photos used in this section will be eligible for a grand prize of \$500, to be awarded at the end of the year. The winner will be chosen from all entries published, so get a photo or two, plus a brief description, and send them in!

Send those pictures to: Pilot Projects, *Model Airplane News*, 100 East Ridge, Ridgefield, CT 06877-4606 USA.



## PROP-ER DRESS REQUIRED

John Williams of Visalia, CA, constructed this F-86 from a Paul's Flying Stuff design. He installed a 2-inch prop extension so that he could fit the SuperTigre engine and custom-built tuned pipe inside the fuselage. John added his own "flow-through" firewall to provide cooling and a "nice smoke trail out the rear." We're told that the 5 1/2 pound "jet" flies great at 90mph down to just 15!

## PARASOL PRIDE

Louis Petrolia of North Bay, Ontario, Canada, restores furniture for a living, so he's no stranger to wood. He scratch-built this Pietenpol from a set of plans that came with the Bob Martin RC Models Inc. kit. After first applying white Super Coverite, Louis used some of his furniture-finishing techniques to achieve the antique finish. After spraying on numerous coats of various shades of cherry stain, he topped it off with a water-based lacquer. We're told that although it was certainly a challenge, the plane looks great, especially in the sunlight. The Pietenpol is an excellent slow flyer and is powered with a Saito .40 4-stroke.





## FREEPORT FAIRCHILD

Robert Huisinga of Freeport, IL, proudly poses with his 1/4-scale Fairchild F24W46. The 9-foot model is from Robert's own plans that he adapted from factory drawings. The plane is covered with Solartex and topped with K&B epoxy paint. The markings match those of the 1983 EAA Grand Champion winner at Oshkosh. Power for the 33-pound monoplane is supplied by a Quadra 52 engine.

## ALONSO'S AMPHIBIAN

Wrightwood, CA, modeler Oscar Alonso built this 32-pound PBY Catalina from the original series of Paul Matt drawings. The plane is modeled after a Newfoundland fire-fighting aircraft. The big amphibian has a 130-inch wingspan and is powered by a pair of Moki .61s equipped with glow drivers; Oscar even incorporated scratch-built retracts into his scale masterpiece (photo by Richard Gustafson).



## RIVETING STORY

William Teson of Vancouver, WA, has beautifully replicated the Northrop "Metal Miracle" in 1/6 scale. William made the Texaco-sponsored racer, "Gamma," from an Aero Classics kit. The model spans 78 inches and has a Saito .56 4-stroke for power. The realistic finish was made using Specialty Tape and features 5000 hand-embossed rivets.

## FLYING TIGERS

Here are two versions of Dynaflyte's Fun-Scale P-40 built by Ron Johnson of Signal Hill, CA. Both planes were modified to accept Robart 85-degree mechanical retracts, and they have Magnum .53s for power. Ron covered the warbirds with Carl Goldberg white film and then used spray cans to do the camo work. Ron says that "the P-40s are fun to fly and fun to watch."



## BLENDED BIPLANE

Ron Britzke of Newburgh, NY, started with the 1938 Elf Biplane design for this 78-inch model. He adapted the wings from a *Model Airplane News* contest free-flight plan ironically called "The Plagiarist." Ron uses Hitec radio gear for control, and the plane is powered with a Magnum .40 engine. The transparent yellow and blue MonoKote really highlights Ron's fine craftsmanship.



# HINTS & KINKS

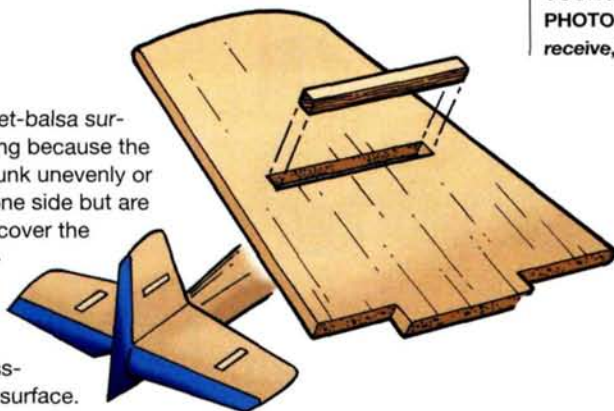
BY JIM NEWMAN

**SEND IN YOUR IDEAS.** Model Airplane News will give a free one-year subscription (or one-year renewal, if you already subscribe) for each idea used in "Hints & Kinks." Send a rough sketch to Jim Newman c/o Model Airplane News, 100 East Ridge, Ridgefield, CT 06877-4606 USA. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we can't acknowledge each one, nor can we return unused material.

## TRUE TAIL

Prevent your sheet-balsa surfaces from warping because the covering has shrunk unevenly or you've covered one side but are still preparing to cover the other. When constructing the surfaces, recess a hardwood strip—cross-grain—into each surface.

Bob Winski,  
La Grange Park, IL



## IMPRISON SMELL

Mix your epoxy in a plastic food container. When you have finished using the adhesive, snap the lid on to contain the odor.

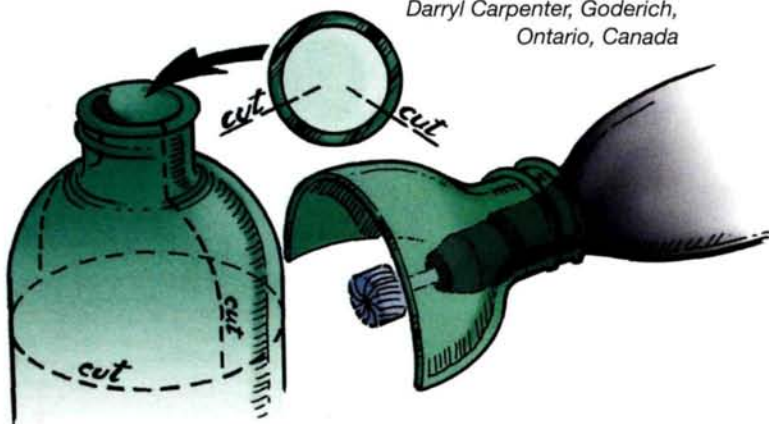
Pete Noell,  
Langhorne, PA



## BOTTLED SAFETY

Cut a discarded soft-drink bottle as shown, then snap it over the nose of your rotary tool as a shield against flying debris. As Darryl remarks, "Although this does protect your face, it is still no substitute for good safety glasses."

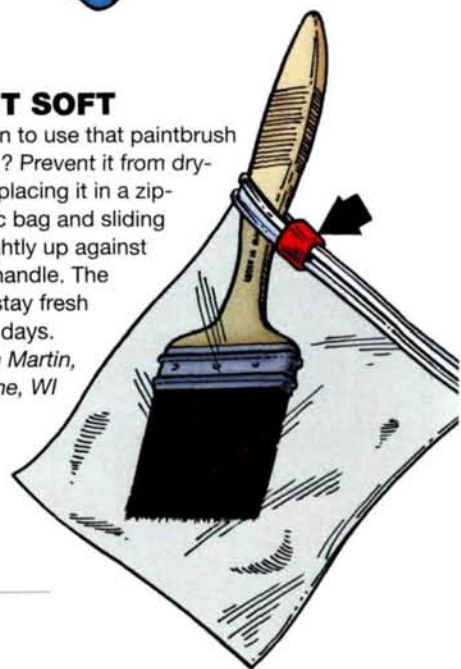
Darryl Carpenter, Goderich,  
Ontario, Canada



## KEEP IT SOFT

Do you plan to use that paintbrush again soon? Prevent it from drying out by placing it in a zip-type plastic bag and sliding the lock tightly up against the brush handle. The brush will stay fresh for several days.

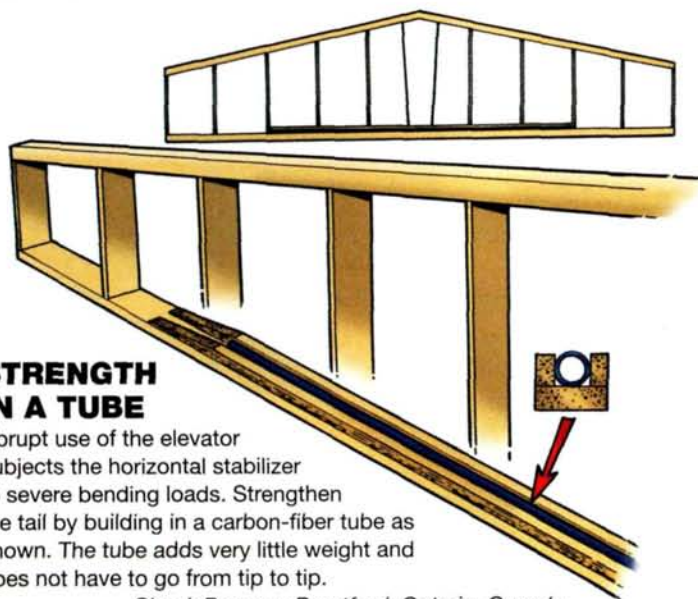
John Martin,  
Racine, WI



## STRENGTH IN A TUBE

Abrupt use of the elevator subjects the horizontal stabilizer to severe bending loads. Strengthen the tail by building in a carbon-fiber tube as shown. The tube adds very little weight and does not have to go from tip to tip.

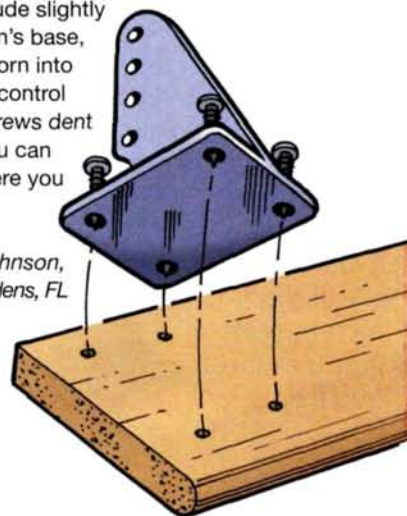
Chuck Barsony, Brantford, Ontario, Canada



## ON YOUR MARKS!

Here's an easy way to mark the positions of the holes for your control-horn screws. Allow the screws to protrude slightly through the horn's base, and press the horn into position on the control surface. The screws dent the wood so you can see exactly where you should drill the screw holes.

Bob Johnson,  
Palm Beach Gardens, FL

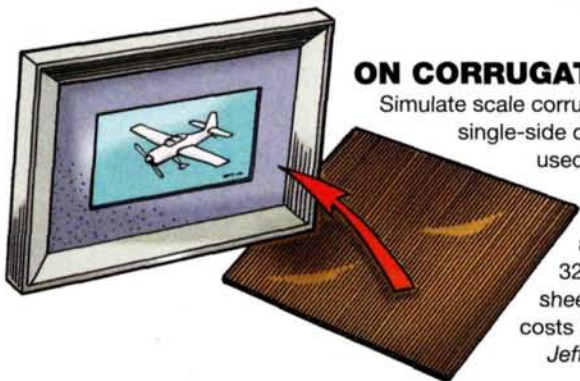




## ON CORRUGATED WINGS

Simulate scale corrugated surfaces with the single-side corrugated matte board used by picture framers. The "MX-14" sample sent to us is by Crescent and is available in useful 32x40- and 40x60-inch sheets; the smaller sheet costs less than \$10.

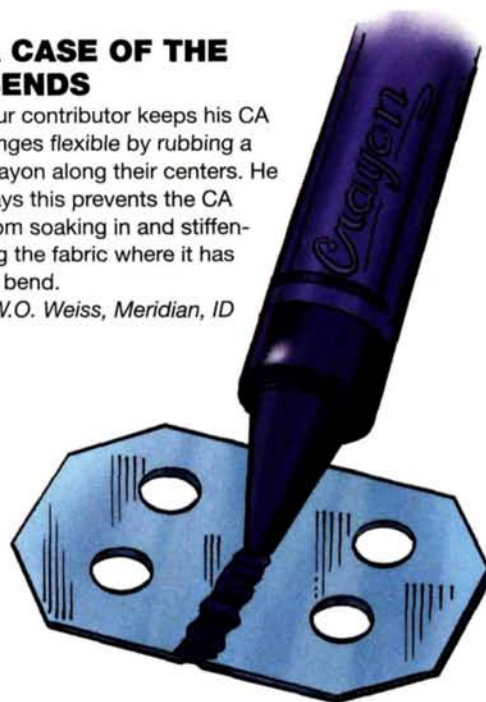
Jeff Wenzel, Fayetteville, NC



## A CASE OF THE BENDS

Our contributor keeps his CA hinges flexible by rubbing a crayon along their centers. He says this prevents the CA from soaking in and stiffening the fabric where it has to bend.

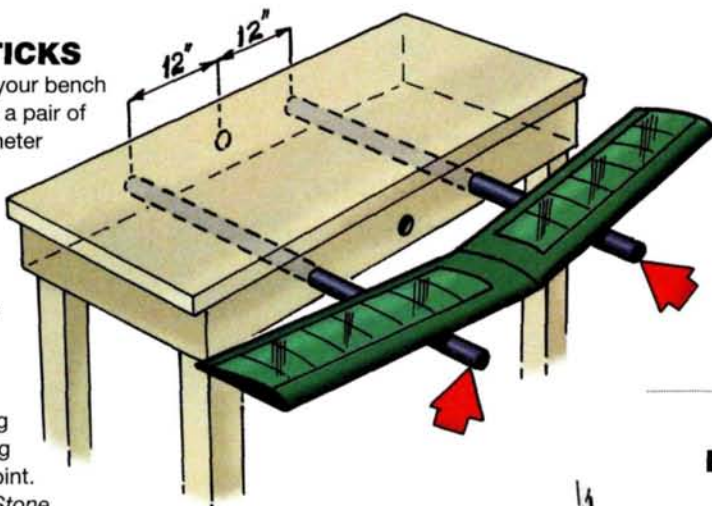
W.O. Weiss, Meridian, ID



## ON THE STICKS

Drill the sides of your bench to accommodate a pair of long, 1-inch-diameter dowels. Cover the working part of the dowels with foam pipe insulation. The dowels provide a cushioned work surface for your fuselage and will support your wing without its rocking on the center V-joint.

Roy Stone,  
Elizabethtown, PA

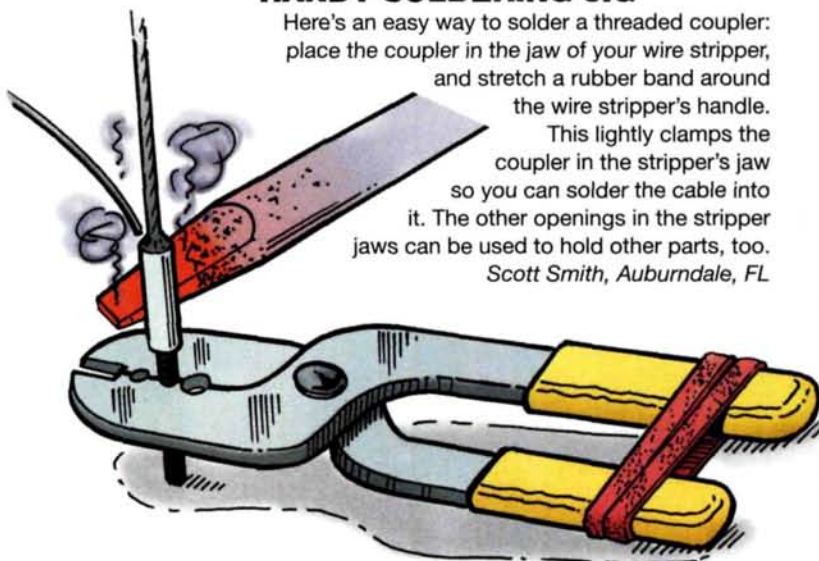


## HANDY SOLDERING JIG

Here's an easy way to solder a threaded coupler: place the coupler in the jaw of your wire stripper, and stretch a rubber band around the wire stripper's handle.

This lightly clamps the coupler in the stripper's jaw so you can solder the cable into it. The other openings in the stripper jaws can be used to hold other parts, too.

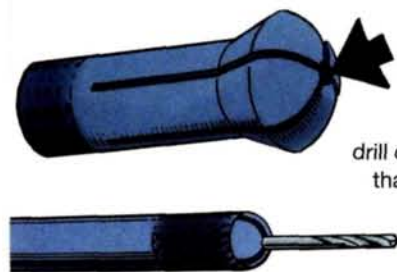
Scott Smith, Auburndale, FL



## PIN AD-VICE

Most modelers have several hobby knives; why not drill out the chucks to sizes that will accept small drill bits? Your hobby knife will then double as a pin vise.

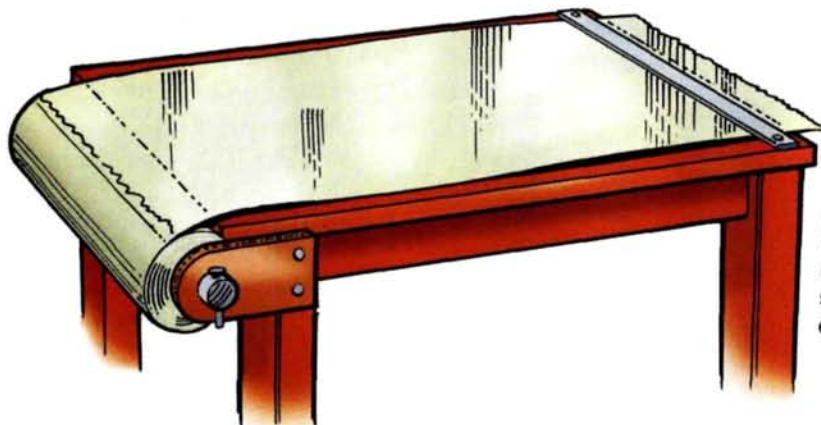
Karl Byman, Longview, WA



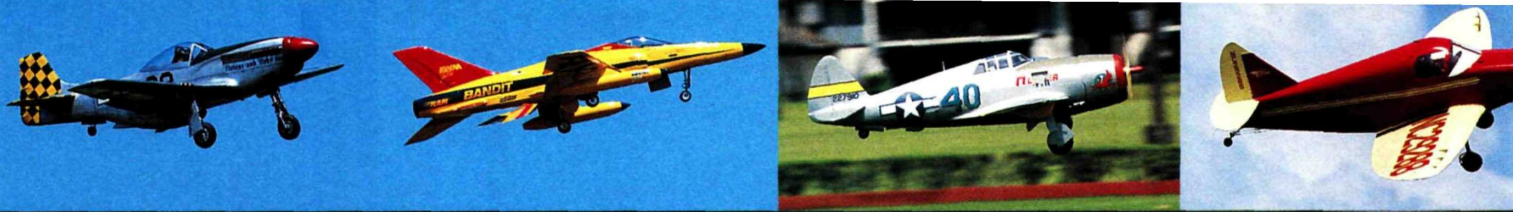
## ENDLESS TABLECLOTH

This modeler always has a clean work surface that's protected from paint and glue; he bought a 1,100-foot roll of wax paper for \$10 at a deli. He mounted the roll on one end of his bench and ran the paper under a flat aluminum strip that's riveted to the other end. He uses the sharpened aluminum strip to tear off used portions of the paper.

Dan Luchaco, Sayre, PA





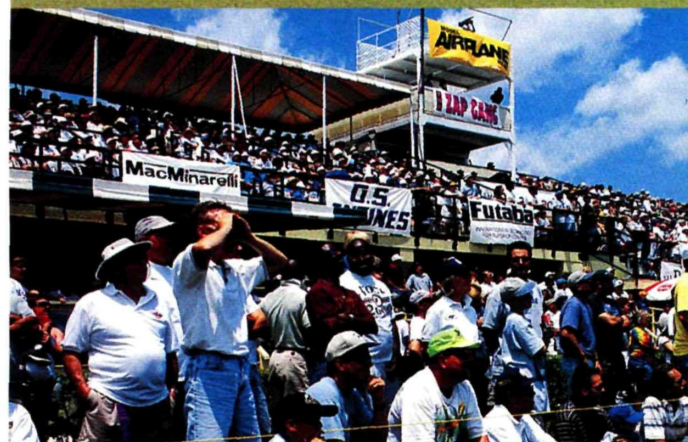


Model Airplane News and Zap present

# TOP GUN 2000

by Debra Sharp and Gerry Yarrish

**E**ach year in the last week of April, more than 60 top RC scale builders and pilots gather in West Palm Beach, FL, to compete at the most prestigious scale event in the country—the Top Gun Invitational. In its 12th year, it is a grand experience, and simply to be invited—let alone place in this competition—is a great accomplishment. Pilots from all across the United States as well as Canada, England, Germany and South America come prepared to compete for the title of “Mr. Top Gun.”



## FIRST PLACE TEAM SCALE



Repeating their '99 performance, Bill McCalle and Ed Berton captured first in Team Scale with this Zero M3 Hamp. Built from enlarged Platt plans, the Japanese fighter is powered by a 3W-70 gas engine.

## FIRST PLACE EXPERT



First-place winner in Expert, Terry Nitsch flew this awesome 1/8-scale Rafale B-01. Built from a BVM kit, the Rafale has a 61-inch span and is powered by twin AMT turbines. Terry also earned the High Total Flight Score award. This is Terry's fifth first place in Expert!





Tom Wood's BVM Phantom comes in for a landing. Powered by a Ram 1000 turbine, Tom's 1/6-scale F-4 placed third in Expert. Tom also won the Best Jet award.

## FIRST PLACE DESIGNER

### MR. TOP GUN

**F**or the second year in a row, the winner in Designer Scale was Jeff Foley with his immaculate Me-109E. Jeff earned an impressive 96.667 points in Static and an overall score of 192.459; that's a mere 0.668 point more than the first-place Expert winner, Terry Nitsch. (The title "Mr. Top Gun" goes to the first-place winner with the highest score.)

Jeff's 1/4.5-scale Messerschmitt has an 86-inch span, weighs 24 pounds and is powered by a Moki 1.8 2-stroke glow engine turning an 18x10 prop. Jeff uses a JR PCM radio and modified Platt retracts in his 109.







## THE ROAD TO TOP GUN

by Rich Uravitch

First-time visitors to New York who ask, "How do you get to Carnegie Hall?" often get the response: "Practice, practice, practice." I've concluded that much the same advice applies to the premier RC scale aeromodeling event, Top Gun, although the three "P's" could be modified to

"Plan, practice, perform." Take it from me: on the road to Top Gun, you'll need all three of these ingredients plus a little luck.

## PLAN

If you're serious about getting to Top Gun, the adventure starts long before your invitation arrives in the mail. It begins when you select your subject and amass all the documentation required to produce a model that for all the world looks like a shrunk-down miniature of a full-size airplane. Do not start with a kit and then try to find documentation to match it; you'll build your



Rich Uravitch (right) and pitman Lenny Stanko move Rich's P-47 Thunderbolt to the static-judging area. Teamwork is a must at Top Gun.



Rich Uravitch's Thunderbolt was built from Zirolti plans and is powered by a Sachs 6.2ci gas engine turning a 24x14 prop. The 92-inch-span fighter weighs 38 pounds and has a PPG polyurethane finish.

## Details—inside as well as out!

Scale models are judged on various features, including outline, color and markings and craftsmanship. At Top Gun, the scale perfection and beauty of the models are much more than just "skin deep." Each

Dave Platt's Hawker Hunter



Dave Fogarty's Ercoupe



Second place in Expert went to Greg Hahn and his beautifully executed SBD Dauntless. Powered by a Zenoah GT-80 twin gas engine, the 104-inch-span dive bomber weighs 44 pounds. In Expert, Greg gave winner Terry Nitsch a real run for his money: he was only 0.333 point out of first—close competition!





Nick Zirolli's TBM Avenger/Tarpon Mk. 1

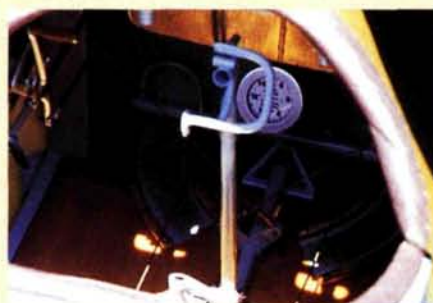


Miguel Berastain's P-40 Warhawk

competitor lavishes many hours of building time on areas that are not readily noticed with a casual glance. In places such as the wheel wells, flap retract gutters, machine-gun bays and wing-attachment joints, details are faithfully reproduced but often remain unseen. But the main focal point of any scale model remains the miniature pilot's "front office"; we all seem to be drawn to the magical area beneath the canopy glass: the cockpit.

Instrument panels and bezels, rudder pedals, control columns and throttle quadrants are all part of cockpit detailing, and the modelers at Top Gun take their interior-decorating chores very seriously.

It is interesting to note that most, if not all, of the contestants scratch-build all the parts that go into their model's cockpit. From the pilot's seat and shoulder straps to the cockpit coaming and mag switches, nothing seems to be too small for Top Gun pilots to replicate. It's all part of the game.



Fokker D-VIII cockpit detail by Wayne Frederick

self a trap from which a sharp judge won't allow you to escape. And believe me, the static judges at Top Gun have seen and heard it all, so trying to put one over on them just won't fly (no pun intended). You will, however, come away from the static-judging table much smarter and more aware of the shortcomings of your model. You will be able to identify what your model needs to gain that additional  $\frac{1}{2}$  or  $\frac{1}{4}$  point and decide whether you think it's worth the effort. You might want to risk the points loss when a judge informs you that your national insignia has been incorrectly sized or placed, and fixing it will mean cutting new friskets and a repaint!

When you see a model such as Tom Polapink's Pfalz earn "High Static" award and compare it with his documentation, you know that Tom was focused; same for Nick Zirolli Jr.'s big Grumman TBM Tarpon (Avenger, to you USN types) and Jeff Foley's Bf-109E. All of these beautiful models were flown in Designer Scale, where the builder designed and scratch-built the model. That's one of the advantages of building from your own plans: markings, panel lines, fairings and other details fit in the proper locations because the scaling ratio is constant. Properly



Teeth in Expert, Tim Reedman flew this impressive Ram 1000 turbine-powered F-4. Built from a BVM kit, the Phantom weighs 28 pounds and has a 57-inch span.





# DESIGNER CLASS

POS.	PILOT	SCALE/MODEL	SPAN (IN.)	WT. (LB.)	KIT/PLAN	ENGINE/FUEL	PROP
1	Foley	1/5 Me-109E	86	24	Own	Moki 1.8/Omega	18x10
2	Zirola Jr.	1/6 Avenger	106	45	Own	Eagle 4.2/gas	Zinger 24x10
3	Torres	1/6 Beech T-34C-1	80	21	Own	YS 1.40/Sig	Mst 16x6
4	Polapink	1/4 Pfalz D.IIIA	94	23	Own	Moki 1.6/Coolpower	Zinger 16x6
5	Benjamin	1/4 Taylorcraft	108	22	Own	Astro/own	16x6
6	Roane	3/8 Shoestring	85	16	Own	Saito 180/Red Max	APC 16x6
7	Vaillancourt	1/2 Typhoon	97	35	Own	Q-75/gas	Zinger 24x12
8	Johnson	1/6 F-82G	102	38	Own	O.S. 1.06/Byron	APC 16x6
9	Feroldi	1/3 DH-2 Airco	113	35	Own	Sachs 4.2/gas	24x10
10	Hayes	1/7 Ayres Thrush	83	15	Own	RCV 120/Omega	15.5x12.5
11	Platt	1/4 Magister	102	25	Own	Moki 2.10/Wildcat	APC 20x10
12	Frederick	1/4 Fokker D-VII	83	16	Own	Saito 180/own	16x6
13	Uiberlacher	1/6 Tempest	82	22	Own	Moki 1.6/Wildcat	Moki 18x10
14	Kosewski	1/4 Fokker EV 191B	84	22	Own	Q-35/gas	Zinger 20x8
15	Fogarty	1/4 Ercoupe 415-D	90	22	Own	Moki 1.8/Wildcat	APC 16x6

# EXPERT CLASS

1	Nitsch	1/6 Rafale B-01	61	35	BVM	AMT/Jet A	—
2	Hahn	1/6 Dauntless	104	44	Zirola plans	GT-80/gas	24x10
3	Wood	1/6 F-4	57	26	BVM	RAM 1000/Jet A	—
4	Barbee	1/6 Waco YMF5	110	45	BMA	126cc MM/gas	30x10
5	Labonte	1/6 Harvard Mk. IV	101	38	Yellow Aircraft	Sachs 4.2/gas	—
7	Chevalier	1/6 Tri-Pacer	120	39	Effinger plans	ZDZ 60 RV/gas	24x8 Clark
6	O'Meara	1/6 Corsair F4U	62	21	Taylor plans	Webra 35cc/PowerMaster	Zinger 16x6
8	Gabrys	1/6 MiG-15	68	23	BVM	Ram 750/Jet A	—
9	Chew	1/6 P-47D	92	35	Zirola plans	G-62/Gas	22x10
10	Redelman	1/6 F-4	57	26	BVM	RAM 1000/Jet A	—
11	Diaz	1/6 MiG-15	66	20	BVM	RAM 750/Jet A	—
12	Weiss	1/6 MiG-15	66	23	BVM	AMT Merc./Jet A	—
13	Bussell	1/6 Spitfire MK14C	88	24	Yellow Aircraft	Q-38/gas	20x6 Zinger
14	Campana	1/6 MiG-29	72	38	FiberClassics	RAM 750/Jet A	—
15	Sousa	1/4 Culver Cadet	89	10	Clements plans	O.S. 1.60/Morgan	18x6
16	Winter	1/4 Tiger Moth	88	24	Barkley	G-38/gas	20x6
17	Tiano	1/6 P-47 Razorback	82	32	Aerotech	Brisson 42/Av-gas	Moki 22x10
18	Benson	1/6 T-34C	80	22	R. Torres	Moki 1.8/Sig	16x8 3-blade
19	Miller	1/6 Corsair F4U	93	33	Zirola plans	Saito 450/Wildcat	22x10 Master
20	Pike	1/7 DHC-3	96	18	Union	O.S. 1.60/Omega	18x8
21	Denicola	1/6 Skyraider	100	35	Zirola plans	3W-60/gas	22x12
22	Kretz	1/6 Spitfire Mk14	88	25	Yellow Aircraft	Moki 1.6/Omega	Zinger 18x8
23	Alvarez	1/6 F86F	76	22	FiberClassics	RAM 760/Jet A	—
24	Bartkus	1/6 Focke-Wulf 180	80	22	Holman	Moki 1.8/Byron	APC 18x8
25	Ulavitch	1/6 P-47 T-Bolt	92	38	Zirola plans	Sachs 6.2/gas	24x14 Zinger
26	McCurry	1/6 Me-109G	78	18	Platt	O.S. 1.08/Wildcat	APC 15x8
27	Voglund	1/6 P-51D Mustang	84	27	Aerotech	Moki 1.8/Omega	16x6 Zinger

# TEAM CLASS

1	Berton/McCallie	Zero M3 Hamp	91.5	31	Platt plans	3W-70/gas	22x12
2	Stevick/DiGiorgio	1/5 P-51D	102	36	FiberClassics	3W-80 R2/gas	24x12
3	Siewert/Sandquist	1/6 P-47	82	31	Aerotech	Brisson 4.2/gas	Zinger 22x10
4	Caudle/Violett	1/6 T-33	72	19	BVM	RAM 760/Jet A	—
5	Valdez/Shulman	1/6 P-80	72	19	BVM	RAM 750/Jet A	—
6	French/Patton	1/6 Panther F9F	82.5	36	CAI	AMT Pegasus/Jet A	—
7	Snyder/Dodgen	1/6 MiG-15	68	21	BVM	RAM 760/Jet A	—
8	Molinsky/Claussen	1/7 P-61	114	47	Zirola plans	Q-45/gas	20x6
9	Berastain/Swift	1/4 P-40 Warhawk	94	36	Zirola plans	Q-75/gas	Mejzlik
10	Araujo/Gonzalez	1/7 Rafale B	64	38	BVM	RAM 1000/Jet-A	—
11	Donofrio/Greco	1/4 Sikorsky S39B	156	45	Own	B&D 6.1/gas	Syntec
12	Krzanowski/Hiller	1/7 MiG-17	53	16	Tad plans	Jet Cat/Jet A	—





RADIO	GEAR	FINISH	STATIC SCORE	TOTAL SCORE
JR PCM	—	Poly resin/K&B	96.667	192.459
Airtronics	Robart	Auto paint	95.333	190.583
Futaba	Own	K&B epoxy	91.167	186.542
Airtronics	—	Sig dope/fabric	97.083	185.333
Airtronics	—	Stits System	93.333	183.416
Futaba	—	Super Coverite/dope	91.167	181.542
JR	Likes	Acrylic lacquer	94.083	181.541
Futaba	Own	Glass/Hobby Pox	90.083	180.833
Futaba	Own	Sig Coverall/dope	94.333	176.416
JR PCM	—	Glass/K&B paint	91.000	174.875
Ace	—	Nelson System 3	93.583	172.000
Futaba	—	Outdoor latex	91.333	164.000
Futaba	Own	Silkspan/dope	97.000	125.875
Airtronics	—	Fabric	94.583	97.583
Futaba 9Z	Platt	Glass/Du Pont paint	93.417	93.417
JR	BVM	PPG Automotive	95.583	191.791
JR PCM 10X	Robart	Z-Poxy/auto acrylic	95.333	191.458
JR	BVM	PPG Automotive	96.500	189.750
Futaba	—	Stits auto finish	94.083	187.250
JR 10X	Yellow	Automotive lacquer	94.583	185.666
Futaba 8	—	Coverite butyrate	91.250	184.208
Airtronics	Barton	PPG Concept	94.333	183.708
JR PCM	BVM	DuPont auto paint	91.667	183.250
JR PCM	Robart	Z-Poxy /glass	89.667	182.709
JR	BVM	PPG Automotive	92.917	182.500
Graupner	BVM	PPG Concept Series	88.917	182.250
JR 10X	BVM	PPG System	90.833	181.042
Futaba	Yellow	Auto acrylic	92.667	181.250
Futaba	FiberClassics	Auto lacquer	90.750	181.042
Airtronics	—	Stits System	92.667	180.917
Futaba	Own	Stits Lite	93.250	179.917
Airtronics	Robart	Glass/Z-Poxy	91.417	179.459
Futaba 9Z	Robart	Lacquer/clearcoat	91.667	178.417
Airtronics	Wildcat	Glass/paint	92.250	178.250
Airtronics	—	Silk/dope/epoxy	89.333	176.208
Futaba 9	Likes	Fiberglass/Hobby Pox	87.583	175.291
Futaba	Yellow	K&B epoxy	91.333	164.208
JR PCM10	Rhom-Air	Capt'n Butch	89.333	117.791
Futaba	Own	Perfect Paint	88.167	113.917
Futaba	Robart	PPG Polyurethane	90.000	112.792
JR 10X	Platt	Hobby Pox	96.833	96.833
JR	Century Jet	Hobby Pox	90.833	90.833
JR	C. Jet	Hobby Pox	95.500	190.625
JR	FiberClassics	Nitrate dope	96.083	189.583
Futaba	Robart	PPG auto paint	95.583	189.166
JR	BVM	PPG Concept Paint	94.667	189.042
JR	BVM	PPG	93.750	188.125
JR	Robart	PPG System	92.500	185.208
JR	BVM	PPG	94.833	184.208
JR	Robart	PPG auto paint	91.917	183.209
Futaba	Robart	Automotive finish	91.750	182.250
Airtronics	BVM	PPG auto paint	94.750	150.125
Futaba	Own	Randolph dope	95.000	122.708
JR	BVM	Acrylic lacquer	89.917	92.917

## Tech Talk

### ENGINES

Moki	9
Quadra	5
3W	4
O.S.	4
Saito	3
Zenoah	3
Sachs	3
Brisson	2
B&D	1
Eagle	1
RCV	1
Webra	1
YS	1
ZDZ	1

### RADIOS

JR	22
Futaba	20
Airtronics	10
Ace	1
Graupner	1

### RETRACTS

Robart	12
BVM	11
Modelers' own design	8
Platt	3
CJM	2
FiberClassics	2
Likes Line	2
Yellow Aircraft	2
Barton	1
Rhom-Air	1

### CONSTRUCTION

Kits	23
Own	16
Plans	15

### AIRCRAFT TYPE

Military	45
Jet	15
Civilian	9
Monoplane	49
Biplane	5
WW II	24
WWI	4

### TURBINES

RAM	10
AMT	3
Jet Cat	1







done, kits can also score well as long as you know which 3-view the manufacturer used during the kit development and it's available to you. If the kit's outline or proportions are different from those you present to the judges in your scale 3-view, you're inviting trouble.

## PRACTICE

You need only look at the quality of models at Top Gun and, more specifically, the ones that return each year (up to the "three years with the same model" limit) to get a feel for what it takes to win. Very rarely—if ever—has a first-year airplane taken all the marbles. You simply can't fly

an airplane as well as it needs to be flown to win if you have only a half dozen or so flights on it before the event. Often, modelers spend so much time building, finishing and detailing the model that they're not inclined to "sport" fly it. I fell victim to this scenario with my P-47, "Miss Mary Lou." Although I had built the model

## Special Awards

Each year, special awards are presented to the Top Gun contestants in recognition of superior achievement above and beyond the points earned on the scoreboard. A committee of Top Gun judges and other industry personalities candidly observe and ultimately pick each year's recipients of these impressive and well-deserved awards.

### SPECIAL AWARDS

High Static	Pilot	Aircraft	Sponsor	Award
Designer	Tom Polapink	Pfalz	Aerotech	\$200
Expert	Pat McCurry	Me-109G	Pro-Mark	\$200
Team	Bill Stevick	P-51	Dave Platt Models	\$200
Best Aircraft				
Civilian	Mike Barbee	Waco	Hitec RCD	Radio gear
Jet	Tommy Wood	F-4D	A.M.T	\$200
Military	Greg Hahn	SBD Dauntless	Don Smith Plans	\$200 certificate
Biplane	Mike Barbee	Waco	RC Report	\$200
Pre-WW II	Rich Feroldi	Airco DH 2	Glenn Torrance Models	\$200
Cockpit Interior	Sepp Uiberlacher	Tempest	Ray & Robin's Hobby	\$200
Special Achievements				
Charlie Chambers Craftsmanship Award	Paul Donofrio	Sikorsky	The Zap Gang	\$200
Engineering Excellence	Paul Donofrio	Sikorsky	O.S. Engines	O.S. 160 Twin
Gray Eagle Award	Art Johnson		Model Airplane News	Eagle trophy
Top Buns Award	Gustavo Campana		Top Gun Hussies	\$100
Critics' Choice	Nick Zirolli Jr.	Avenger	Airtronics, Van Dell Jewelers and Ron Norris	\$200, trophy and Moki 2.10

### BEST FLIGHT PERFORMANCE

Jet	Terry Nitsch	Rafale	Bob Violett Models	\$200 certificate
2-stroke	Art Johnson	F-82	Moki USA	Moki 2.10 engine
4-stroke	Bud Roane	Shoestring	Saito Engines	Saito 150 engine
Gas	Rich Feroldi	Airco DH 2	MacMinerrelli Engines	100cc 2-cylinder
Multi	Randy Claussen	P-61	Plastic Engineering	\$200
High Total Flight Score	Terry Nitsch	Rafale	Futaba Radio	Servo pack



Built by Paul Donofrio and flown in Team Scale by Anthony Greco, this beautiful Sikorsky S-39 amphibian became the first model to earn the Charlie Chambers Memorial Craftsmanship award. Beautifully crafted, the model was loaded with the finest details. His work also earned Paul the Engineering Excellence award.



# Top Gun Colors *by Rick Bell*



More hand-painted markings by Greg Hahn.

While admiring all the beautiful models in the pits at this year's Top Gun Scale Invitational, I began to wonder how these talented builders had applied the various squadron markings and nose art to their models. Did they paint them? Did they use commercial graphics? And, if they did, were the graphics custom-made? With my curiosity piqued, I decided to ask some of the builders. Their answers were as varied as the models.

Custom-made, printed-vinyl graphics were most commonly used. The modelers had scanned a scale image into a computer drawing program and then sent the file to a decal company such as Pro-Mark or Model Graphics.

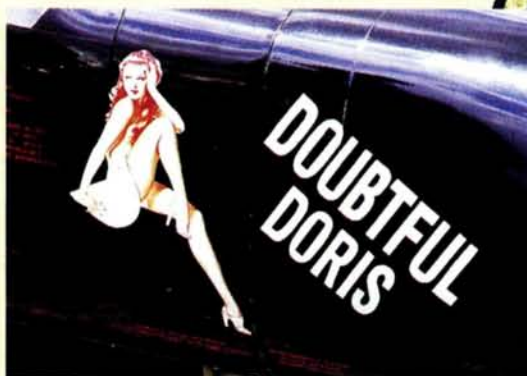
These markings are fairly easy to apply and are so thin that they look painted on! Some great examples were the nose art on Paul LeTourneau's big Tigercat and the tail art on the F4 Phantom built by Tom Wood.



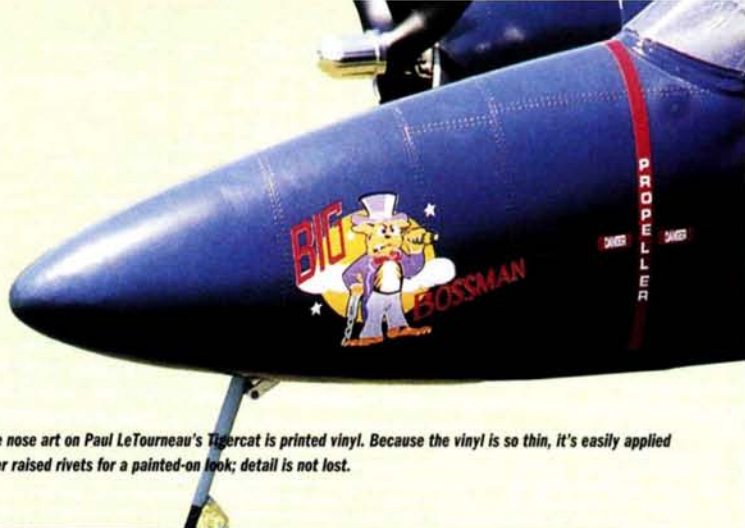
Above: the nose art on Greg Hahn's B-25 is a fine example of what can be done with a fine paintbrush and a steady hand Right: here's a close-up of some of the hand-painted nomenclature on Greg Hahn's B-25. Simply amazing!

Another way to get vinyl markings is to take your image to a local graphics/sign shop and have them cut it out of solid-color vinyl. This is very good for simple designs such as letters and numbers. For very small "stenciled" nomenclature, dry-transfer or "rub-on" lettering was the most common medium used. These small letters are available in several styles and colors from well stocked art-supply stores. Dry-transfer markings are also available from Aeroloft Designs.

The scale team of Dan Molinsky and Randy Clausen used a slightly different approach: for the striking nose art on their beautiful P-61 Black Widow, Dan scanned the images from his documentation package and then printed them on a



The nose art on this beautiful P-61 Black Widow was created using a scanned computer image and then printed on a clear decal sheet—very accurate indeed!



The nose art on Paul LeTourneau's Tigercat is printed vinyl. Because the vinyl is so thin, it's easily applied over raised rivets for a painted-on look; detail is not lost.

clear sheet of water-slide decal material. He then cut out the markings, applied them to the model and fuelproofed them—with impressive results!

For those who have a steady hand, painted nose art is the way to go. Both of Greg Hahn's backup models—a B-25 and a P-47—had painted markings; the level of detail is amazing! Other outstanding models with painted markings were Dave Chew's P-47 and Miguel Beraqstain's Flying Tiger P-40.

When you consider all the possibilities, there really is no "black magic" involved in creating a model with Top Gun looks; you just have to want it badly enough and find a way that works for you.



The markings on Dave Chew's P-47 are all painted on using Testor Model Masters paints.

## Markings of the masters

Tom Wood's F4 Phantom makes good use of printed vinyl and dry-transfer, "rub-on" lettering for the small nomenclature stenciling.







Earning second place in Designer Scale, Nick Ziroll Jr. flew this magnificent Grumman TBM Avenger/Tarpon Mk.1. The 106-inch-span torpedo/bomber weighs 45 pounds and is powered by an Eagle 4.2ci gas engine. Nick's model featured functional bomb-bay doors (and droppable torpedo), flaps, Robart retracts and a retractable tail hook.

## Halftime High Jinks

As is traditional at Top Gun, there is a halftime show each day. A regular show-within-a-show, the noontime extravaganza presents to the general public the excitement and fast-paced action of RC aviation. Orchestrated by Bubba Spivey of Lanier RC, the halftime show goes off without a hitch or lull in the action. From beautiful Tournament of Champion aerobatic sequences and the buzz of RC combat to RC paratroopers and a mini-turbine-powered sonic boom, the show has something for everyone.

Of special note were the awesome aerobatic talents of Chip Hyde and Jason Shulman. Both flew giant-scale aircraft and performed every trick in the book. Low inverted passes that had the props clipping the grass and rolling circles and loops that seemingly defied the laws of physics were all part of these two pilots' bag of tricks.

Also part of the show was Mac Hodges' aerobatic B-29 Super Fortress, Terry Nitsch flying his turbine-powered jet and Don Muddiman wringing out his famous ZAP Machine. Never one to be left out of the action, Bubba also flew part of the airshow along with his wingman Wayne Voyles. These two showmen performed formation aerobatics with a pair of Bubba's new DA 150cc-powered Monster Stingers.

Each year, the Top Gun halftime show delights the spectators who have come out and filled the bleachers to see what RC is all about. The entire Top Gun experience is a great way to learn and be entertained, too.

During the noontime show, Chip Hyde put a 42-percent-scale Lanier Staudacher S-300 through its paces. An awe-inspiring RC pilot, Chip really showed the audience what RC excitement is all about. The S-300 is powered by a twin-cylinder DA 150 gas engine.

the block a few times and have probably judged a lot of scale models at all levels of competition. Some of them also fly full scale, so the clearer you make your intentions when you brief your flight, the less room you leave for interpretation and potential downgrade. For instance, I needed to explain to the judges that when I perform a "roll" with my P-47, it doesn't look the same as an overpowered, lightly loaded Extra 300. My P-47 needs to replicate the flying qualities of a heavy, WW II

fighter. Remember: the judges will score you on what you brief them. Properly positioning your maneuvers also improves your score. A takeoff that starts downfield so that the model breaks ground and the gear starts moving into the wells as the plane passes in front of the judges will always earn a higher score than a takeoff that starts directly in front of the pilot and breaks ground a few hundred feet away. Take a cue from the aerobatic and IMAC guys: keep your routine within an imaginary box. Your sequence should appear as realistic as you can make it in terms of speed, attitude and position. When Greg Hahn pitches over his big Zirolli SBD Dauntless into a nearly 90-degree dive, extends the perforated dive brakes and puts that scale 500-pounder 50 feet out in front of the judges, you know he's got it all together! (And it didn't come from fly-

Dave Platt, a true master scale model designer and builder, does a little "PR" with the help of a younger assistant. Good public relations is one of the keys to ensuring the growth of our hobby.

almost two years before Top Gun 1999, it had only six flights on it before the event, and a radio problem claimed it during practice. When I rebuilt it for Top Gun 2000, I didn't want to risk the potential damage of repeated flying, and I entered the model without flying it again—a very bad move!

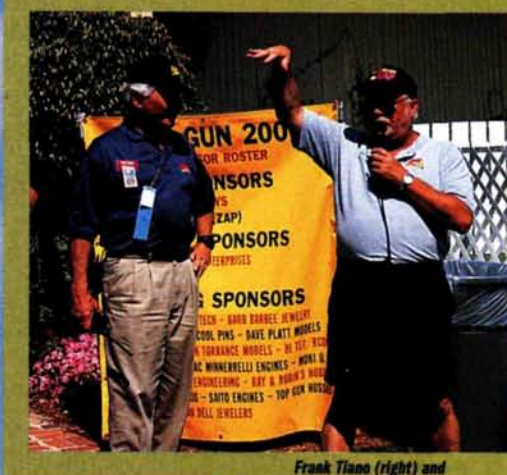
Top Gun winners usually know their models well and have flown them numerous times and under various conditions. This shows in their flying and certainly is reflected in their flight scores. Sure, they may have repaired the model along the way, but if this ultimately doesn't cost points in static judging, the experience gained from flying the model makes all the difference in the world.

### PERFORM

Back to the judges .... Like the static boys, the flight judges have been around







Frank Tiano (right) and announcer Sam Wright during a pilots' meeting. Frank is the man behind Top Gun, and he's the driving force that keeps the event going.

## Top Gun Tiano

Every great event begins as the brainchild of a single individual who nurtures the idea and then presents it to others who help plant it so it can sprout in the direction of its destiny. Top Gun is no exception, and the man whose idea was its seed is Frank Tiano.

The event was first held in Coral Springs, FL, in April 1989. In 1990, Frank moved the event

to the Spook Hill Flying Field in Arizona; then, in 1991, Top Gun found its way to West Palm Beach, FL, where the Palm Beach Aero Club has since been its host.

Pacer Technology—the Zap gang—and *Model Airplane News* have been the major sponsors, and Top Gun has grown to be recognized as the premier scale RC event in the country—perhaps in the world.

Many thanks go to Frank for having such a great idea!



Above: some of the many aerobatic aircraft in the halftime show—all from Lanier RC.

Below left: Bubba Spivey, the inspiration behind the halftime show, works on a Lanier CAP 232. Bubba sure does put on a good show!

## TOP GUN SPONSORS

### PRIMARY

Model Airplane News  
Pacer Technology (ZAP)

### ASSOCIATE

Airtronics  
Frank Tiano Enterprises  
Futaba  
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### SUPPORTING

Barb Barbee Jewelry  
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Hobbico  
JR Radio  
Pan American Intl.  
Ron Norris  
The Aeroplane Works  
Warehouse Hobbies  
Wildcat Fuel  
Yellow Aircraft

ing the model two or three times a year.)

So, gain some experience at the local level, develop some credentials and be willing to compete against some of the greatest guys in the scale modeling world, and you might be ready to give Top Gun a go. Is it worth it? Only you can be the judge of that. I've competed there for seven of its 12 years, and getting that invitation is every bit as exciting now as it was seven

years ago. Will I ever be Mr. Top Gun? Anything is possible; all I have to do is follow my own advice, gain a point or two here and there, make everything work reliably and pray that all the guys who usually finish in front of me don't show up! If you are a serious scale modeler and have the time, resources and drive to hack the program, set Top Gun as a goal. As the salty "Air Boss" from the movie reluctantly informs "Mav" and "Goose," "You're gonna get your dream shot. You're going to Top Gun!"

Top Gun has been called a contest, but that's kind of like calling Mt. Everest a hill or the Grand Canyon a ditch! It's not a contest; it's an event—an RC spectacle of the highest order. It's well-run, well-attended and looked forward to by modelers and enthusiasts everywhere—even those of us who toil a year or more over our entries. I hope to see you there next April, some of you from this side of the fence! ✦



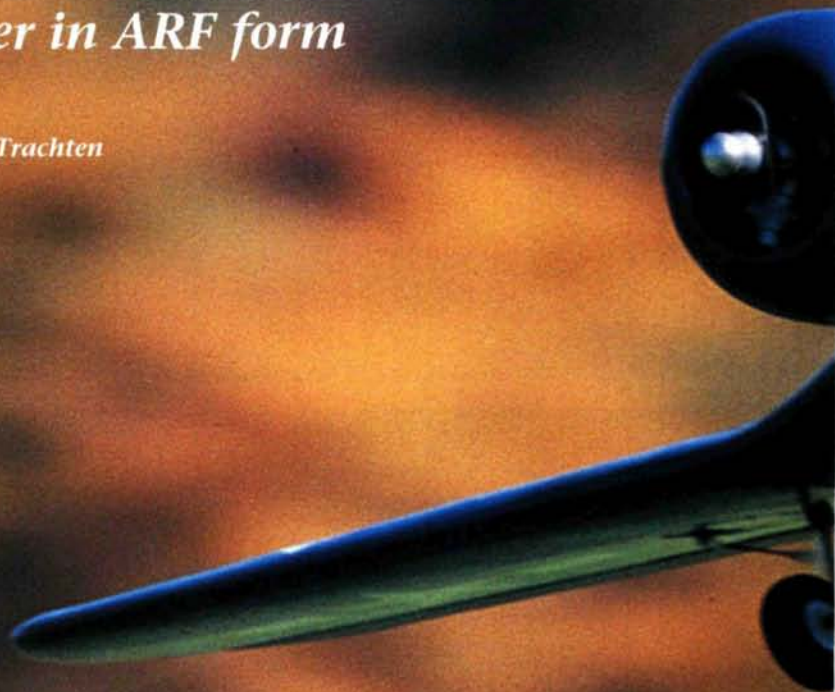
GLOBAL HOBBY  
DISTRIBUTORS

# F4U Corsair

**M**ention the name "Corsair," and you'll get responses that vary from a complete history (including Pappy Boyington's Black Sheep squadron) to a vague, "Isn't that the plane with the funny wing?" Among RC fliers, it is one of the most popular warbirds, but unfortunately, because of its unusual, inverted gull wing, one that's least built. By coming out with an ARF F4U, Global\* has answered the prayers of many builders who have avoided this impressive, bent-wing warbird.

*A South Pacific  
fighter in ARF form*

*by Craig Trachten*



PHOTOS BY WALTER SIDAS & BOB HASTINGS





## SPECIFICATIONS

**Model:** F4U Corsair  
**Manufacturer:** Global Hobby  
**Model type:** .46 ARF sport scale  
**Length:** 41 in.  
**Wingspan:** 53 in.  
**Wing area:** 500 sq. in.  
**Weight:** 5.5 lb.  
**Wing loading:** 25.36 oz./sq. ft.  
**Engine req'd.:** .46 to .60 2-stroke;  
.52 to .65 4-stroke  
**Engine used:** .46 Magnum XL  
**Prop:** APC 11x6  
**Radio req'd.:** 4-channel (throttle,  
rudder, elevator and aileron)

**Radio used:** Futaba 8 UAP w/five  
FMA servos

**List price:** \$330

**Features:** one-piece wing, painted  
fiberglass cowl, complete hardware.

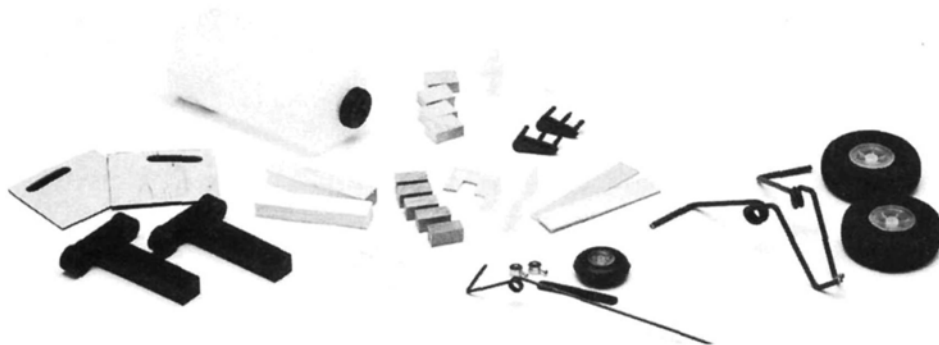
### Hits

- One-piece wing.
- Expertly covered with markings applied.
- Great flight performance.

### Misses

- Some errors in the instruction manual.





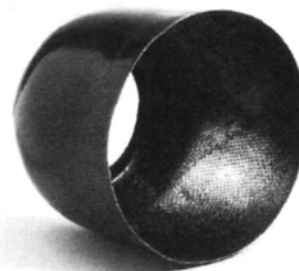
**The basic hardware package that comes with the Corsair includes wheels, formed landing gear and tailwheel, engine mounts, fuel tank, control horns and clevises.**

This kit was an absolute pleasure to build. Not only have the pain and agony of building the bent wing been removed, but the high-quality workmanship is typical Global, too. Just open the box, and you'll see what I mean. The most impressive part of the kit is that one-piece wing; no joining two wing panels for this bird! After you've calmed down and inspected the rest of the kit, you will find, as I did, that there is much more to be impressed by.

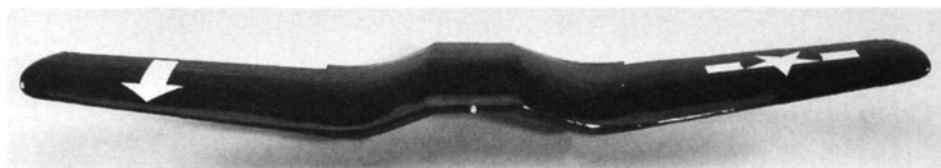
Even though the kit is an ARF, it is far from a beginner's kit. Before you attempt this one, you should have a few kits under your belt and know how to fly a tail-dragger. Having said that, I won't bore you with a "glue part A to part B" description, but rather, I'll try to convey some tips I found helpful in completing the kit. The few problems I encountered

concerned the illustrated instructions—not the model. I've been told that addendum sheets will be included in future kits.

The model's scale shape is achieved with high-density foam reinforced with lite-ply side walls and formers. All the parts fit very well, and the entire model is expertly covered with



**The radial engine cowl is made of fiberglass and comes trimmed to shape and ready to screw into place.**



**The inverted gull wing comes in one piece and completely covered; a big savings in building time!**

film. The control surfaces are built of balsa wood. The kit is very complete and includes all the hardware to finish the model, including formed landing gear, a formed canopy and a painted fiberglass cowl.

## THE WING

I began construction with the wing, and since it is in one piece, there isn't a lot to do here. I glued the aileron hinges into place, then I cut open the servo-mounting areas and the opening at the center of the wing. A nice touch here is that Global has already installed pull-strings in the wing so you can "snake" the aileron servo leads to the center wing section. Thank you, Global! Hatch covers come already covered with film to hide the aileron servos, and when screwed into place, they fit flush with the wing bottom.

## FLIGHT PERFORMANCE

The first flight of my Global Corsair occurred on a nice sunny day with little wind and humidity—perfect for test flying. The Magnum .46XL was broken in and running nicely, and everything was set to go. Forget about the inverted gull wing; it intimidated me a little at first, but I soon found that the model flies just like any other sport ship.

### • TAKEOFF

The Corsair is not at all hard to fly, but you do need some tail-dragger time before you fly any WW II warbird. Advance the throttle slowly, and be ready to feed in as much right rudder as necessary to keep the model going straight down the runway. The model has no tendency to nose over while taxiing, but at the beginning of the takeoff run, keep some up-elevator in to keep the tailwheel on the ground until some speed has been built up. As the tail comes up, ease off the up-elevator and allow the model to fly itself off the ground. With the Magnum .46 for power, this takes about 75 feet. Once it's airborne, keep the model at a modest climb angle until it gains sufficient airspeed and then climb to a safe altitude. On the first flight, I had to add a fair amount of left aileron and some up-elevator trim. This was later corrected by adjusting the clevises.

### • LANDING

As with any high-performance model, you should hold in a little power during the final approach and then, when you have the

model above the end of the field, cut the power to idle. The model has good slow-speed behavior, and there is plenty of elevator authority to flare the model into a 3-point landing. It is not a "floater," but the Corsair does land nicely.

### • GENERAL FLIGHT CHARACTERISTICS

In a word: great! This model has a solid, stable feel and flies very well at all speeds. For my style of flying, I use 30-percent expo and keep the rates on high. When the model is asked to stall, it does have a tendency to lower its left wingtip a bit before the break. Recovery is very quick with the release of up-elevator and a slight application of power.

### • AEROBATICS

Vertical performance is good, but I would not call it unlimited. There is plenty of power and control authority to perform every trick in the book. It's a Navy fighter, so low, high-speed passes with a sweeping climb-out—topped off by a victory roll—are a blast! Loops are big and smooth, and rolls are very axial. Inverted flight is not hard but requires a bit of down-elevator. The only thing you have to watch for is excessive elevator throw. If you have too much, you can enter a high-speed-stall situation, but this is not uncommon to most WW II fighter designs. Keep the throws where the instructions say to, and you'll be fine.

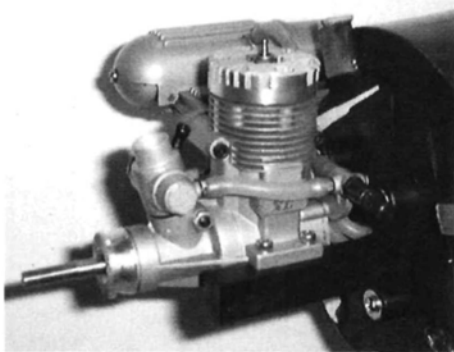
—Bob Hastings



## F4U CORSAIR

The landing-gear wire fits into blocks that come already built into the wing; all I had to do was slice open the covering above the block and fit the gear wire into place. For a better look, I epoxied the gear into the slotted blocks instead of using landing-gear straps.

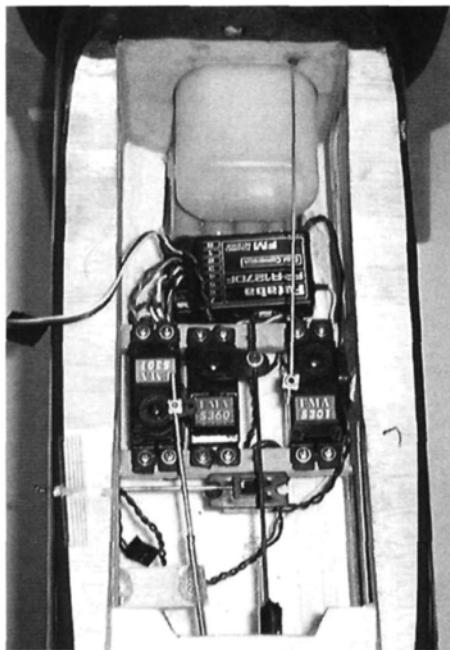
I then placed the wing in the wing saddle to check its fit. I had to slightly elongate the hole in the forward fuselage former to make it fit perfectly with the hold-down dowel at the front of the wing. Two bolts at the TE hold the wing securely in place. With the wing still bolted to the fuselage, I trimmed and glued the plastic belly pan into place on the bottom of the wing. I used canopy adhesive to glue the pan directly to the wing's film covering.



*A Magnum .46XL is an ideal powerplant for the Corsair. Installation is easy, and a recessed area permits the use of a standard muffler.*

### FUSELAGE

With the wing taken care of, I began to install the engine. A paper engine-placement template comes with the kit, but I found that when I used it, the muffler did not line up with the recessed area in the fuselage. It is best to bolt the engine to the engine mount and attach the muffler to the engine, then use the entire assembly to determine the location of the firewall mount holes. With the entire unit in



*Nothing unusual here; there's plenty of room for the radio system in the fuselage. Note fuel-tank installation.*



*The tail surfaces are shaped and covered and are ready for hinge installation. Note that the rudder and elevators replicate the cloth-covered surfaces of the full-size Navy fighter.*

place, you can mark the hole locations with an awl.

After I had installed the engine, I put the fuel tank together and installed it in the cutout formers at the front of the fuselage. My instructions showed an oval fuel tank installed vertically, but the cutouts in the bulkheads positioned the tank horizontally. This was no big deal, but I did

have to make sure that the tank stopper aligned with the hole in the firewall. Whichever way you install your tank, be sure to position the vent tube so it is at the top of the tank. With the engine in place, the cowl can easily be screwed into place.

The tail feathers were next, and their installation was very easy; the parts fit in the slots nicely. I used 30-minute epoxy to glue the stab and fin into place. After the epoxy had cured, I installed the rudder and elevator halves.

### RADIO AND CONTROL LINKAGE

Now is a good time to install the servos; with them in place, you can make up and install the pushrods. I used FMA\* 301 servos for throttle, rudder and for each aileron, and I used a 360 for the elevator. For the throttle linkage, a solid pushrod wire guide through a plastic outer tube is used, as is the case for the rudder pushrod. The elevator pushrod is made of wood, and it has threaded-wire rod ends. Each elevator half has its own control horn, and the pushrod has two wire ends and clevises. The tailwheel wire goes all the way through the fuselage and is connected to the bottom of the rudder with a 90-degree bend.

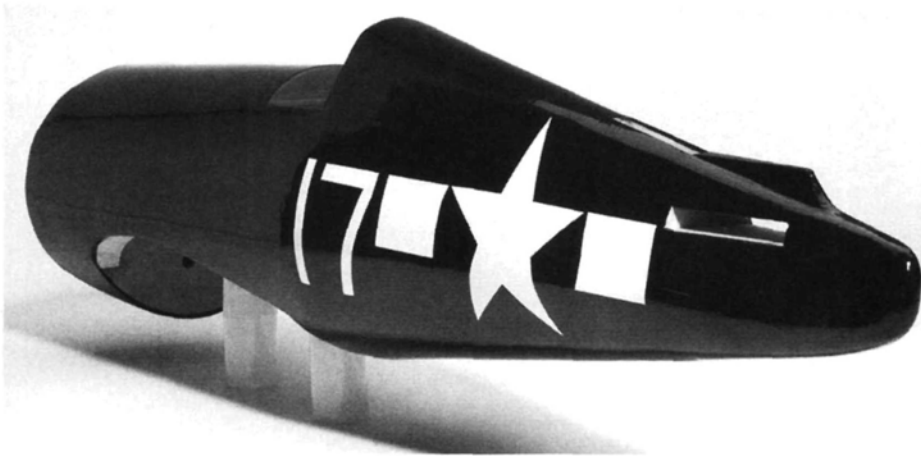
The tailwheel assembly in my kit has a coiled wire to provide spring action, but the instructions did not show this minor change. To ease its installation, slip the mounting plate onto the wire before you insert it through the fuselage.

### FINAL ASSEMBLY

All that's left to do is to install the wheels, attach the clevises and glue the canopy into place. To dress up the model a little, I used stick-on trim material cut into strips to duplicate the canopy framework. This looks a lot better than trying to paint the frames on. Don't forget to add a suitable pilot figure before you close the cockpit. I also used small pieces of sliced fuel tubing to secure the clevises and prevent them from opening during flight.

I set the model's control throws and the center of gravity as shown in the instructions, and the model flew beautifully the first time out.

If you've ever wanted to build this South Pacific fighter but didn't do it because of that unusual wing, here's your chance. The Global Corsair is a dream to build and fly; Pappy Boyington would be proud!



*The foam and wood fuselage also comes completely covered with the markings already applied; nice workmanship!*

*\*Addresses are listed alphabetically in "Featured Manufacturers" on page 150. ★*



*Expand your flying capabilities*

HANGAR 9

# Ultra Stick ARF

*by Roger Post Jr.*

**A**t a past Weak Signals hobby expo in Toledo, OH, I had an opportunity to chat with Eric Meyers of Horizon Hobby Distributors. We spoke about the use of multi-servo wing setups for powered aircraft and how control mixing could expand a model's flight possibilities. Most of our conversation concerned coupling flap and aileron control for faster roll rates and other applications such as "crow configuration" controlled by the throttle stick. Interesting thoughts, but to take advantage of these unusual control setups, a specially designed model would be needed. The Hangar 9\* R&D staff must have heard what Eric said because the newest addition to the Ultra Series—the Ultra

Stick ARF—is just what the doctor ordered!

With its 76-inch wingspan, the Ultra Stick is big for a sport model. It is designed to expand the flight capabilities of the model and its pilot; when set up for quad-flap-control mixing and powered by a Saito\* 1.80 4-stroke engine, the Ultra Stick is simply a blast to fly!





## SPECIFICATIONS

**Model:** Ultra Series Ultra Stick ARF

**Manufacturer:** Hangar 9/Horizon Hobby Inc.

**Type:** sport aerobatic

**Wingspan:** 76 in.

**Wing area:** 1,165 sq. in.

**Weight:** 11 lb., 5 oz.

**Wing loading:** 22.25 oz./sq. ft.

**Airfoil:** symmetrical

**Length:** 60 $\frac{1}{8}$  in.

**Engine req'd.:** 1.08 to 1.35  
2-stroke; 1.20 to 1.80 4-stroke;  
Zenoah G23 gas

**Engine used:** Saito 1.80 4-stroke

**Propeller used:** APC 16x8

**Radio req'd.:** 4 to 7 channels w/4  
to 7 JR\* 517 (or better) servos

**Radio used:** JR 10X

**List price:** \$249.95

**Features:** 90-percent prebuilt ARF construction, Goldberg Ultracote covering; top-quality hardware package; good instruction manual with computer programming tips;

pre-applied decals; flap/aileron mixing; standard 4-channel radio with a Y-harness can be used.

**Comments:** assembling the wing was the most pleasurable ARF experience ever; a perfect fit! With the quad-flap, control-surface setup, the Ultra Stick has unlimited flight possibilities. The slow speed that it can attain will allow even a novice to enjoy this model.

### Hits

- Perfectly matched wing roots and shaped wing joiner.
- Computer radio setup guide in manual.
- Excellent, complete hardware package.
- Ailerons and flaps on wing for an expanded flight regime.

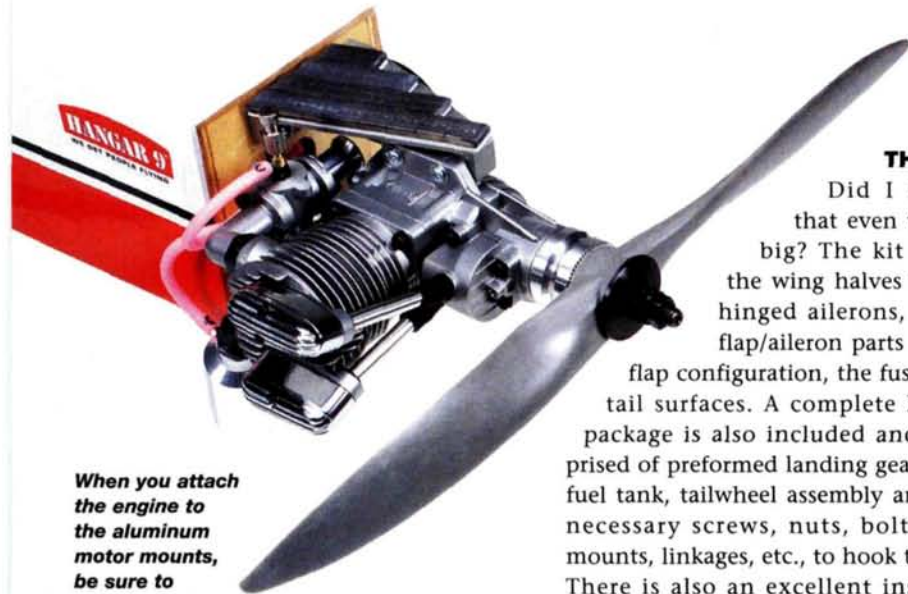
### Misses

- Lack of servo-extension-guide tubes in wing.
- Vertical fin tab that goes into the fuselage slot could be longer.



PHOTOS BY WALTER SIDAS





When you attach the engine to the aluminum motor mounts, be sure to place it in the extreme forward position. Note that there are 5 ounces of lead attached to the top motor mount.

## INSIDE THE BOX

Did I mention that even the box is big? The kit includes the wing halves with pre-hinged ailerons, optional flap/aileron parts for quad-flap configuration, the fuselage and tail surfaces. A complete hardware package is also included and is comprised of preformed landing gear, wheels, fuel tank, tailwheel assembly and all the necessary screws, nuts, bolts, motor mounts, linkages, etc., to hook things up. There is also an excellent instruction manual featuring concise text and clear photos. The manual contains many helpful hints and a 36-page guide for

programming computer radios (JR and Futaba) for quad-flap setup. The model is made of plywood and balsa, and the main components come 90-percent built and covered with Goldberg's\* Ultracote. All the hardware is heavy-duty, and the aluminum landing gear is 3/16-inch thick.

*Editor's note: three batches of the Ultra Stick kits were produced. The first two batches had solid tail feathers, excluded the built-up horizontal stabilizer and tended to be tail-heavy. The current—and all future—versions have lightening holes cut into the tail feathers to lessen this tail-heavy condition.*

## FLIGHT PERFORMANCE

If you are going to hand-start your Saito 1.80 4-stroke, use a heavy-duty, padded chicken stick and try this method: choke the engine with one turn of the propeller, set the throttle to idle and turn the propeller counterclockwise two or three times. Turn the propeller clockwise until you can feel some compression. Attach your glow-plug igniter and flip the propeller clockwise. After about eight flips, the engine should kick back counterclockwise and start to run.

If you're using a 1400mAh battery pack, limit your flight times to four 10-minute flights, and then recharge the pack. The use of seven servos places an enormous drain on the battery. If possible, use a higher capacity battery pack.

### • TAKEOFF AND LANDING

In a 5- to 10-knot headwind, the Ultra Stick will take off in about 30 feet with about 2/3 power—flaps up. It tracks very well on the ground and requires almost no right rudder to compensate for left-turning tendencies. At 1/2 throttle, some up-elevator trim is needed, but no other trim changes will be required.

I used the new JR 10X radio to control the Ultra Stick, and for the takeoff, I used 85 percent control-surface throw (middle switch setting) on all three of the dual-rate functions. There was plenty of control authority at these settings.

It's very exciting to take off with full flap deployment (2 inches of deflection) at full throttle. The Ultra Stick leaps into the air at a 60- to 70-degree angle of attack (AoA). The Saito 1.80 has more than enough power to haul the model into the air this way. But you must be prepared for the steep climb-out angle.

To land the Ultra Stick (flaps up), gradually reduce the throttle, line up on the runway and land it like any other trainer you've flown. There are no surprises here; with its thick airfoil, the model slows down nicely and provides a comfortable landing-approach speed.

If you use crow configuration to land (flaps down 2 inches, both ailerons up 3/4 inch), line up with the runway at about 50 feet out and 100 feet high on the approach. Chop the throttle to idle

and deploy the crow setting; then, point the plane straight at the ground, aiming for the runway's extended centerline. At about 10 feet of altitude, pull out of the dive and land. It is really incredible how the model slows down in the crow configuration—especially when pulled out of a dive into level flight. In deadstick landing, trim the model for best glide and fly it in; the Ultra Stick glides wonderfully.

### • LOW-SPEED PERFORMANCE

The plane is incredibly stable in the low-speed flight regime. In a slight headwind, with the throttle just above idle and the crow setting deployed, the Ultra Stick can be slowed to zero ground speed at a 45-degree AoA. It can also hover in a vertical position until the fuel runs out. In either case, there is plenty of control authority with high dual rates set. During a low-speed stall, the nose gently dropped forward, and there was no tendency for a wing to drop.

### • HIGH-SPEED PERFORMANCE

With the engine at full power, the model will effortlessly climb straight up. When you dive it down with the power setting just above an idle, pull out at 10 feet off the ground and give it full throttle, the Stick will zoom past you at about 40- to 50mph. It is not a speed demon, but it is certainly not a slow plane at full power.

In a power-on stall, the plane falls forward fairly quickly, but this only happens when the plane is in the vertical position and has reached the end of its climb.

### • AEROBATICS

This airplane can do them all: loops, rolls, spins, 3D maneuvers, knife-edge flight, etc.—you name it. If you couple the flaps to the elevator, the loops (both inside and outside) become very tight; and with the flaps coupled to the ailerons, the roll rate is extremely quick. With the control surfaces set for their maximum recommended throws, there is plenty of control authority to muscle the Ultra Stick around the sky during its aerial ballet. To help smooth out the flight performance, use about 20-percent exponential with the high rate settings.

The Ultra Stick is an absolute pleasure to fly, and it will provide many hours of RC fun. Enjoy it.





## ULTRA STICK

### ASSEMBLY

After reading the instructions thoroughly, I inspected the main pieces; the overall quality was good, but I used a covering iron to seal the edges a little better. While the model sat during the assembly process, wrinkles developed in the covering, but a heat gun took care of that.

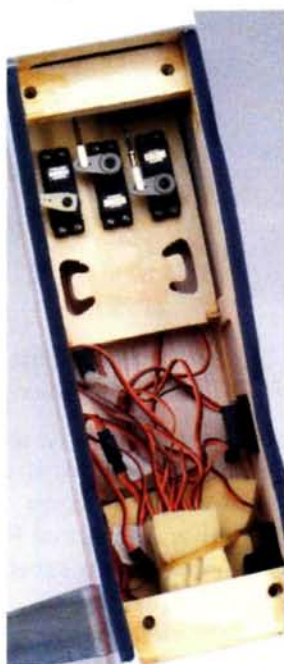
• **Wing.** First, you need to decide which configuration you want to build; I chose the quad-flap setup. Because the wing is symmetrical, it can be a bit confusing which panel is the right or left half. The big decal (pre-applied) goes on the bottom of the wing; at this time, it is also helpful to cut out the aileron/flap servo openings in the bottom of the wing.

Trial-fit the ailerons and flaps to ensure that they are oriented correctly, and then CA the hinges permanently into place.

The wing roots matched perfectly, and the wing joiner didn't require any shaping or sanding; consequently, joining the wing halves was the easiest job in the entire assembly process, and the best match I have ever seen on an ARF. While the wing-joint epoxy cured overnight, I proceeded with some of the fuselage steps.

• **Fuselage.** I applied six-minute epoxy to the firewall for fuelproofing; then, for added strength, I applied CA to the servo tray. For further fuelproofing, I applied CA to the exposed wood areas of the wing saddle. To cushion the wing, I attached thin, stick-on foam strips to each side of the wing saddle.

Next, I assembled the fuel tank and installed all the radio gear except the battery, which I installed later to aid in balancing the model. Last, I assembled and attached the landing gear, attached the engine and installed the throttle-pushrod tube.



*There's plenty of room in the fuselage for any radio system. I placed the battery under the aft portion of the fuel tank and set the receiver directly behind.*

### BACK TO THE WING

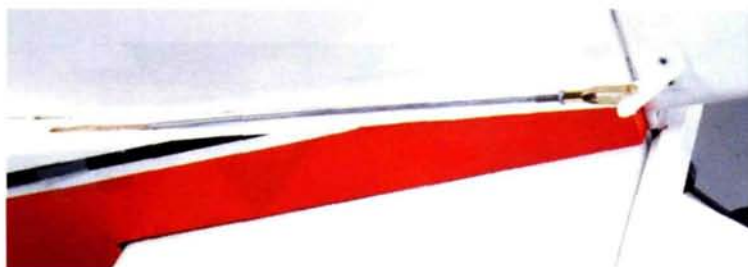
When the wing epoxy has fully cured, install the four wing servos. It would have been nice to have had a cardboard tube in each wing half to run the servo wires and



*The wing servos need to be mounted with the servo spline gear toward the trailing edge and the servo arms pointing toward the wingtips. Be sure to add thread-locking compound to the threads and clevises at the servo end of the linkage.*

A hint: once I had determined the location of the engine-mount blind nuts, I used a thick piece of music wire (with an L-bend at one end) to pull the blind nuts into the rear of the firewall. Before I removed the wire, I placed a large metal file against the back of the blind nut and gently tapped the file's other end with a light hammer. This helped to set the blind nuts further into the wood so they wouldn't fall out when I screwed in the mounting bolts.

I also recommend that you shock-mount the engine to help dampen any airframe vibrations that might occur when the engine is running. Also, paint the propeller tips white. With the engine running, the 16x8 APC\* propeller has a rather large arc that's hard to see.



*To relieve any possible binding, I put a Z-bend in the rudder pushrod where it exits the fuselage slot.*

extensions through. It's a tedious and time-consuming process to tie a heavy nut to a piece of string, feed it through the wing and then tie the string to a servo extension lead to pull it into place. The process works, but you'll need to be patient.

When the servo leads are in place, mark each one with a piece of tape that has the channel number written on it, and then tape them to the bottom of the wing so they don't fall back into the hole. After you've attached the wing-bolt plate, the wing is complete (except for the control-surface linkage connections) and can be mounted to the fuselage.

• **Pushrods.** At this point, I taped the horizontal stabilizer with elevators into place and determined the length for the elevator pushrod. I also taped the control horn into place. My kit had an orange addendum that said to cut the wooden elevator pushrod to 15 inches. I preferred to cut the pushrod 17 inches long.

Next, place the vertical fin (with the rudder attached) in its slot, and determine the length of the rudder pushrod. It should be about 17½ inches long.

I then built the pushrods according to the instructions, except that I placed the threaded wire that goes to the elevator control horn on the side of the elevator pushrod rather than on the top. This change allows the pushrod to move freely as it exits the side of the fuselage. Also, the elevator pushrod required a slight outward bend to help relieve any binding that might occur and, for the same reason, the rudder pushrod required a Z-bend where it exits the top of the fuselage. I then placed the pushrods inside the fuselage and attached them to the servo arms. I also hooked up the throttle pushrod at this time.

### TAIL SURFACES AND TAILWHEEL ASSEMBLY

I saved these steps until later in the fuselage assembly process because I thought it would be easier to get the ends of the pushrods through the narrow slots in the rear of the fuselage before I attached the tail surfaces.

These steps are straightforward, but you must follow them accurately. As the epoxy cures, check the alignment of the stabilizers. Next, attach the tailwheel assembly and the rudder and elevator. You'll need to file a notch into the elevator-connecting dowel so that it will clear the tailwheel wire. When this has been filed, coat the exposed wood with thin CA.



I would prefer to have a longer tab on the vertical fin so that when it is placed in the slot in the rear of the fuselage, its bottom meets the top of the horizontal stabilizer. This change would provide a more rigid attachment of the vertical fin.

When the epoxy cures, attach the control horns and hook up the pushrods. If you use powerful servos, you may find that you'll need to use pushrod exit guides to help stabilize the pushrods. I used the Klett\* large-size guides, and they dampened the pushrod vibration that resulted from a snap of the TX stick.

To balance the Ultra Stick, I had to place the battery pack under the fuel tank, move the receiver all the way forward and add 5 ounces of Prather\* stick-on weights to the engine mount. I also used the aft point of the CG range as the main balance point.

With the servo subtrims set to zero, check to see whether the servo arms (except the throttle) are 90 degrees to the servo case. If they aren't, try to place the servo arm(s) on the gear spline closest to 90 degrees, then use the subtrims to center them. Before you adjust the mix programs, mechanically center each surface by hand. Now you can attach the four control-surface linkages to the wing servos and to the ailerons and flaps. At this point, follow the instructions for your particular JR transmitter. They are written extremely well and are quite thorough in their coverage. The only non-JR TX listed is the Futaba 8UAS; if you have a different brand, you'll need to refer to your owner's manual to set up the many features that are possible with the Ultra Stick's quad-flap setup.

With my JR 10X, I was able to set up a reverse crow configuration (flaps up; ailerons down, but no elevator trim) when the flap-mix landing switch was pushed forward. I can't wait to see what that does when the Ultra Stick is in inverted flight.

#### CONCLUSION

Well, that's all there is to it. The Ultra Stick goes together rather quickly, and you should be able to complete it within two or three days. Modelers who have some ARF building experience will find it easy to assemble. Intermediate and advanced pilots will find this model a pleasure to fly, and the model's sheer size makes it easy to see as it traverses the sky. Have fun!

\*Addresses are listed alphabetically in "Featured Manufacturers" on page 150. ✦

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by Bob Hastings

CARL GOLDBERG MODELS

# EAGLE 2 ARF



**H**ow much success newcomers enjoy in the hobby will largely be based on how well their first trainer flies. My first trainer—a kit—was a blur of balsa, blueprints and words-only instructions. Employees at a local hobby shop patiently led me over the hurdles I encountered, and within five weeks, I had completed the plane. At the time, I couldn't help but think that there had to be an easier way.

Carl Goldberg Models' Eagle 2 ARF offers a friendly welcome

into the hobby and a great foundation on which to start modeling/flying. I've come to believe that we should be involved with some building of our trainers; a lot needs to be learned about

## *Trainer excellence*

control movements, servos and basic installations if a modeler is to be successful with subsequent aircraft. The Eagle 2 ARF allows the learning of many

important lessons, but tasks that may have presented challenges for newcomers have been taken care of at the factory.





## SPECIFICATIONS

**Model:** Eagle 2 ARF

**Manufacturer:** Carl Goldberg Models

**Type:** trainer

**Wingspan:** 62.5 in.

**Wing area:** 714 sq. in.

**Weight:** 5.48 lb. (as tested)

**Wing loading:** 17.68 oz./sq. ft.

**Length:** 49 in.

**Radio req'd:** 4-channel

**Radio used:** Tower Hobbies\* 4-channel

**Engine req'd:** .40 to .45

**Engine used:** Mecoa .46

**Prop used:** APC\* 11x7

**Street price:** \$134.99

**Features:** high-quality built-up balsa-and-ply structure with 2-color Ultracote covering; name-brand hardware, including assembled fuel tank, precut servo tray and pushrods.

**Comments:** a completely inexperienced modeler can successfully assemble the Eagle 2 ARF without problems and will be rewarded with a great flying airplane.


### Hits

- Excellent instructions.
- Preamsembled fuel tank.
- Top-quality wood.
- Scale-like looks.


### Misses

- 2-piece pilot bust time-consuming to build and paint.





*The ailerons and torque rods arrive already installed, and the servo pocket has been cut for you.*



50 MODEL AIRPLANE NEWS



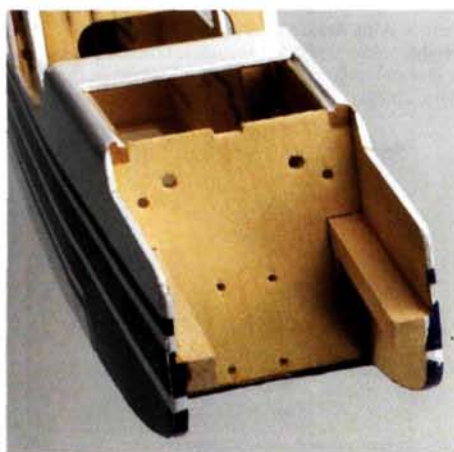
## EAGLE 2 ARF

the empennage to the scrutiny of high-powered strobe lights that revealed a meticulously assembled built-up structure with an intricate diagonal pattern. The vertical fin fits into a slot in the stab to ensure correct alignment the first time out.

### ENGINE

The plywood engine-mounting plate is one of the few items that require you to drill; the plane can accommodate a variety of engine cases. The Eagle 2 is rated for a .40 to .45 engine; having heard so many good things about Mecoa\* engines, I thought this would be a good opportunity to try their .46. The engine-mounting plate is keyed for proper engine thrust, and you install it on top of the hardwood engine rails after you've drilled the mounting holes.

*The hardwood engine mounts are factory installed, and the holes to accommodate the pushrods, fuel line and nose gear are already drilled.*



### FINAL STUFF

One of my favorite Eagle 2 features is that you can install the radio gear in the tray before installing the tray in the airplane; this makes wire routing much easier. Be careful not to get CA on the wire leads when you glue the tray into place. The rest of the assembly is just a matter of installing the radio gear, pushrods and the assembled fuel tank in the forward hatch compartment. CGM includes a 2-piece, vacuum-formed plastic bust "pilot" to top off the trainer. This is the only item that falls below this trainer's generally high-quality standards. Instead of using the fragile glue 'n' paint figure, I covertly removed an Evil Knievel action-figure from the "stunt cycle" in the adjoining office and installed him (the mystery of the disappearance is now solved).

## FLIGHT PERFORMANCE

Prior to the Eagle 2's test flight, I ran three tanks of 15-percent PowerMaster\* through the Mecoa .46. Initially, the engine was tight through TDC, and it actually squeaked as the piston reached the top of the sleeve. Before I was through the first tank of fuel, the engine hand-started easily. It's quiet and powerful; a GS Racing\* exhaust deflector mellowed it even more.

### • TAKEOFF AND LANDING

The ball field's grass desperately needed mowing; the trike's tires were no longer visible as the plane sat idling on the goal line. I advanced the throttle, and the APC 11x6 blazed its own trail. The trainer accelerated quickly and rotated within 75 feet, despite the overgrowth.

A light wing loading, large tail surfaces and lots of dihedral make the plane a joy to land. The Eagle 2 ARF slows down well and tracks beautifully, but without any loss of feel for the controls. The wing's leading edge is not as blunt as a typical D-tube, so it penetrates the air well.

### • LOW-SPEED PERFORMANCE

Predictability is at the top of the Eagle 2's list of good traits. If you make an approach that is too slow, its sink rate increases; a touch of throttle immediately arrests the descent. If you accidentally pull in pitch before power, the Eagle 2 mushes forward until flying speed is achieved again. An induced stall from a high angle of attack results in the same nose-forward flop.

### • HIGH-SPEED PERFORMANCE

The wing penetrates the air well. The plane tracks smartly in turns and actually grooves more like a sport plane than a trainer. The engine's exaggerated downthrust makes the plane resist ballooning under power.

### • AEROBATICS

Yes, I know this is a trainer, but when a beginner wants to transition to an aerobatic ship, it's nice to have a familiar plane that becomes highly agile just by your increasing the control throws. The ball field has a grove of tall pines on three sides and an indoor hockey rink on the fourth. I'm pleased to say that this airplane maneuvers with ease in an area of this size. The plane performs fairly tight loops at a rate of one every 3 seconds, and it rolls axially at a rate of 270 degrees per second.

I was thankful to have the horsepower when a sudden gust turned a slow flyby into a downwind pass. The Eagle 2 snaps well, but the wing must be fully stalled before it will spin. When the controls are released, the plane recovers within half a rotation. The last flight of the day ended with the plane out of fuel at about 200 feet; it was time to wring the Eagle out. I pushed the nose down and leveled out at about 20 feet. The trainer swept past us with a rush of wind. I pulled the nose up at the treeline, laid on the left rudder and stall-turned onto final. The landing gear absorbed a hot touchdown, and the Eagle 2 rolled out approximately 40 feet. Did I mention that this plane is predictable?



### FINAL THOUGHTS

I don't think a beginner could ask for a better airplane to start the hobby with. All of the tough items have been taken care of for you, but there's enough builder involvement to teach some valuable lessons and allow some pride in accomplishment. The plane is honest and pre-

dictable and has a slow approach speed. Dings and dents are an inevitable reality with a first plane. Its all-wood construction will be easy to repair. A little Ultracote, and only you will know about those boo-boos.

*\*Addresses are listed alphabetically in "Featured Manufacturers" on page 150. ✚*



## Hobby Lobby International

# FILIP-V

# GLIDER

**M**any small, neat, RC hand-launched gliders are now available in kit form, as ARFs and as ready-to-fly models. Instead of "arm power," you can use a short high-start, which operates much like a catapult launcher.

I recently acquired the Filip-V, a ready-to-fly, RC hand-launched glider that was designed, constructed and covered in the Czech Republic. Hobby Lobby Intl.\* offers this model for a very reasonable \$99. Hobby Lobby also offers the Up-Start, a lightweight high-start, as an alternative "power source." The Up-Start acts much like a slingshot and can loft the Filip-V up to altitudes of about 100 feet and higher.

Because the Filip-V has a V-tail, I decided to control it with the popular Hitec RCD\* Focus-3 radio system, which includes a built-in V-tail electronic mixer circuit and is now available on FM. This is a joint review of aircraft and RC system, along with my initial experience with a catapult-launching system.

### ABOUT THE FILIP-V

Open the kit box, and you will find a three-piece wing (center panel and two tip panels) covered in lightweight, transparent blue material. You will also find a covered, solid balsa V-tail assembly with factory-installed "ruddervators" (they look like elevators but actually provide both rudder and elevator control, thanks to electronic mixing). A very neat, molded fiberglass fuselage and a removable front windshield round out the kit. The V-tail hardware (two control horns with ball-joint devices) and two lengths of wire in plastic tubing control rods to connect the ruddervators and the servo output arms are also included, as are the front dowel and nylon bolt that hold the wing on the fuselage.

### ASSEMBLY HINTS

The instruction booklet's sketches are quite good, but the translated text is somewhat difficult to follow. I found it easier to first attach the wing hold-down wood dowel to the flat wing center panel, before I attached the tip panels. After inserting the dowel into the wing, I cut a



small access hole on the underside of the wing to get some extra epoxy on the dowel.

Next, I epoxied the V-tail assembly into place, followed by the two control-horn wires with the ball joints, one to each ruddervator. In the front of the fuselage, under the canopy, I added two  $\frac{1}{8} \times \frac{1}{4}$  spruce rails to accept the two Hitec HS-55 microserves. The final control-system job was to connect the wires and their outer

plastic tubing between the servo output arms and the ruddervators. Because the Hitec Focus-3 transmitter has both servo-reversing and a built-in electronic V-tail mixer, control-system hookup in this model is a snap.

Note that the outer plastic sleeves of the two control rods must be anchored in several places between the front and rear of the fuselage. I placed a hardwood strip across the fuselage just aft of the servos





## SPECIFICATIONS

**Model:** Filip-V

**Type:** ARF, parking-lot glider

**Distributor:** Hobby Lobby Intl.

**Wingspan:** 56 in.

**Wing chord:** 7.14 in. (average)

**Wing area:** 400 sq. in.

**Wing loading:** 4.6 oz./sq. ft.

**Empty weight:** 7.6 oz.

**Final weight:** 12.7 oz.

**Length:** 34 in.

**High-start used:** Hobby Lobby Up-Start (no. HLH724)

**Radio used:** Hitec Feather micro receiver, two Hitec HS-55 microsensors and a 4-cell Sanyo 270mAh Ni-Cd pack

**Price:** \$99 (Filip-V); \$19.90 (Up-Start)

**Features:** the Filip-V's open structure is precovered, and the fuselage and canopy are white molded fiberglass. The model can be assembled in only a few hours by installing the RC system, the V-tail controls and a towhook (if you plan to use a high-start).

**Comments:** although originally configured as an RC hand-launch glider, the addition of a towhook and a lightweight high-start makes this a perfect plane for parking-lot

catapult launching. Many quick flights can be put in at small, local flying fields.

### Hits

- Quality of construction is excellent.
- Inexpensive.
- Assembles quickly.
- Good overall performance.
- Not much flying space required.

### Misses

- Written instructions somewhat difficult to follow; no specific V-tail control instructions.
- Canopy attachment could be better.

for one attachment point. Then I drilled a hole in the top of the fuselage, just ahead of the wing-mounting-bolt position, and slipped in another piece of hardwood as a second attachment point. From this point back, the fuselage tapers to quite a small cross-section. To provide one more attachment point, I inserted a piece of 1x1x2-inch foam rubber into the open canopy end and, using a long dowel stick,

rammed the foam all the way back up the fuselage until it was halfway between the wing trailing edge and the V-tail leading edge (LE). The control-surface movement was very positive and firm.

The canopy hold-down is a little primitive and involves a small piece of thin fiberglass material at the front and rear of the canopy. You slide the canopy aft to engage the rear "catch" and then slide it

forward and down until the front catch also engages. I used two small hooks and a tiny rubber band to hold in the sides of the canopy. Because I didn't use a receiver switch, I need to remove the canopy for each flight.

### TOWHOOK

Because the Filip-V is intended to be hand-launched, a towhook is not provided.

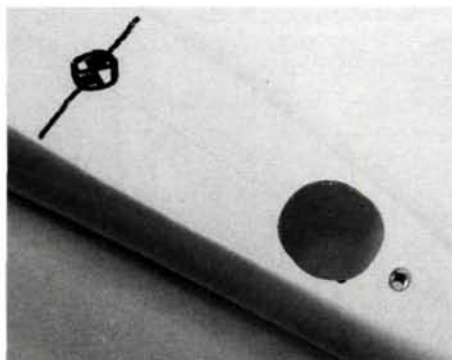


## FILIP-V GLIDER

Although Hobby Lobby does offer one, I decided to make my own out of  $\frac{1}{16}$ -inch-diameter wire. After bending the wire, I made a small trunion block mount out of strips of plywood and spruce. Using a Dremel cutoff wheel, I cut a slot in the bottom of the fuselage to allow the wire hook to pass through. I inserted the wire and hardwood assembly into the fuselage through the canopy opening and held them in place with two, small, sheet-metal screws that are installed from outside the fuselage. This provided a very strong yet lightweight towhook and mount. The towhook is 1 inch back from the LE of the wing.



*The Hobby Lobby Up-Start consists of a short length of surgical tubing and more than 50 feet of lightweight nylon cord. The more cord you add, the higher the glider will go. The large nail is hammered into the ground as an anchor point.*



*I cut a hole in the top of the fuselage, close to the rear wing bolt, so that I could access the wing-bolt nut. Note the CG mark.*

### FINAL BALANCE AND CONTROL THROW

Even with a 270mAh battery pack, I still needed about  $\frac{3}{4}$  ounce of nose weight to achieve the prescribed balance point of 2½ inches back from the LE. (If this happens to you, consider a larger capacity cell such as the Sanyo 350.) Total model weight was 12.7 ounces, which works out to a wing loading of 4.6 ounces per square foot (just slightly lower than Hobby Lobby specified).

Final control throw worked out to about

## HITEC FOCUS-3 FM RC SYSTEM

Previously offered as an AM radio on the 72- and 27MHz RC bands, the Focus-3 has been popular for a few years, and Hitec now offers this FM version. It comes with an 8-cell Ni-Cd battery pack and a system charger and has a 3-channel-capable transmitter with a single, dual-axis control-stick assembly to operate rudder and elevator or aileron and elevator in the conventional manner. A third lever control on the rear of the case operates a proportional throttle or flap-channel function. Also on the rear of the case are two servo-reversing switches (for the first two primary flight-control channels) and a V-tail mixer on/off switch.

The airborne components supplied with this system include two, HS-55 servos and the popular Hitec Feather micro receiver, which now comes with a 40-inch-long antenna.

Hitec cautions modelers about using the Feather for glider applications, such as in this review, because this receiver was specifically designed for use in indoor and parking-lot models. Hitec is concerned that a strong thermal might quickly loft even a small glider up to a high altitude where radio contact might be lost; keep this in mind if you use the Feather in this type of application.

The Hitec HS-55 servos are new and have just a little more output (16 oz.-in. instead of 8.4) than the Hitec HS-50 sub-microservos and weigh just slightly more (0.28 ounce instead of 0.20). I thought the extra output was perfect for this hand-launched glider application.

Although Hitec supplies a battery box that holds four AAA alkaline cells and a mini-switch harness, I made up my own battery pack with four Sanyo\* 270mAh cells; it weighs 1.9 ounces. I don't use the switch harness. Each time I fly, I just remove the canopy and plug in the battery. Total airborne weight of this RC equipment is 2.8 ounces. Keep in mind that if you use 4, 50mAh Ni-Cd cells, the 2-channel airborne weight can be reduced to just 1.4 ounces.



*The FM version of the Focus-3 comes with this Feather receiver and two, HS-55 Feather sub-microservos.*

### SPECIFICATIONS

**Model:** Focus-3 (FM version)

**Manufacturer:** Hitec RCD

**Type:** 3-channel radio operating on 72Mhz RC aircraft channels with FM modulation (low side); compatible with both Futaba and Ace R/C systems.

**Transmitter:** 23 oz., single stick, with a proportional third channel lever on the rear of the case. Includes 8-cell Ni-Cd pack. Servo-reversing on channels 1 and 2 (not 3). Electronic mixing (on/off) for V-tail elevon, or ruddervator.

**Receiver:** the Feather weighs  $\frac{1}{4}$  oz. (7g), operates on PPM/FM and has single conversion circuitry. Hitec standard connectors with the center pin positive. Selectivity is on a par with most RC receivers, but range is somewhat more restricted because of its small size. (See the detailed review in the February 2000 issue of *Model Airplane News*.)

**Servos:** two Hitec HS-55 Feather heavy-duty sub-microservos. Each weighs 0.28 oz. (8g); output thrust—16 oz.-in.; transit time—0.16 second for 60-degree rotation.

**Accessories:** mini-switch harness with a battery pack that can hold 4 AAA alkaline cells; TX battery charger; frequency flag; and instruction manual.

**Total airborne weight:** 3 oz. (with Feather RX, two HS-55 servos and 4 AAA alkaline cells in battery box with mini-switch); 1.4 oz. if a 4-cell 50mAh Ni-Cd battery is substituted without a switch.

**Street price:** \$115

#### Hits

- Single-stick main control of rudder/elevator or aileron/elevator and three full proportional channel functions.
- Two-year warranty.
- Servo-reversing on two channels.
- Electronic V-tail mixing built in.
- 8-cell Ni-Cd TX battery and charger provided.
- Use of Feather airborne components makes it perfect for indoor and parking-lot RC.

#### Misses

- None.



# FLIGHT PERFORMANCE

The Hobby Lobby Up-Start short high-start consists of about 25 feet of thin-wall surgical tubing that's attached to a large nail that must be hammered into the ground. At the other end of the tubing, you attach at least 50 feet of nylon line. Hobby Lobby supplies a 225-foot spool of this line that you can cut to any length. They suggest starting with just 50 feet. You then attach a small ring (supplied) to the end of the nylon line, and this ring is attached to the towhook on the glider.

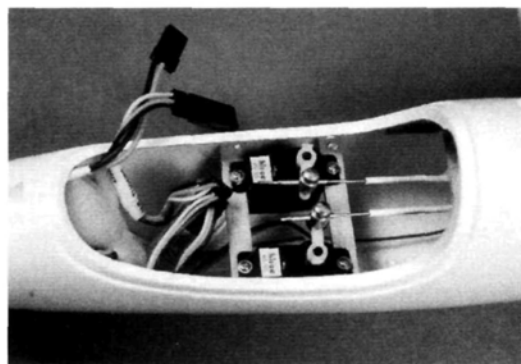
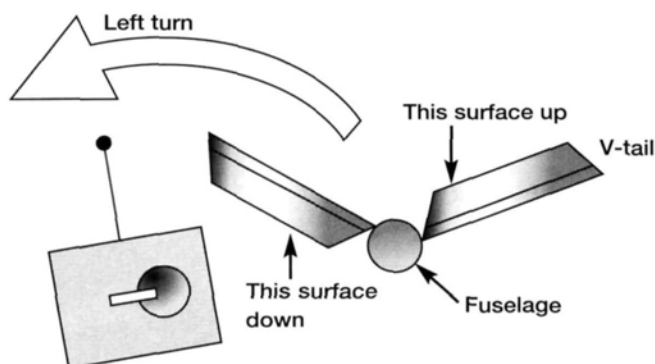
Because the Filip-V is primarily hand-launched, throw it a few times to check out the controls. As you get used to hand-launching it, throw it harder. When you're ready for the first catapult launch, attach the ring to the towhook and walk away until you feel fairly strong tension on the rubber and nylon cord. Hold the model slightly nose high with your right hand while grasping the transmitter with your left. Release the model, and it will quickly rise from this launch point. Try to re-grasp the transmitter as quickly as possible and add some up-elevator; this will cause the Filip-V to rise at an even higher angle of attack. Go for as much altitude as possible until the surgical tubing's energy has been

played out. A quick dip of elevator will usually release the model from the high-start. On one occasion, I found it easier to do a loop to get off the high-start. Experiment to see what makes you the most comfortable.

I found that the Filip-V could get 50 to 75 feet of altitude with the Up-Start—not much, but enough to have fun at a local schoolyard. If you want more altitude, try a longer nylon cord. Flight times are short, but it's easy to get into the air again, and you won't need to refuel or charge batteries.

Flying a V-tail model can be quite different from flying a conventional or T-tail craft. Even if you use a lot of control throw, turning is a little on the sluggish side. On the Filip-V, I used the maximum control throw for the Hitec Focus-3 and linkage and could have used even more. Making the ruddervator control surface a little wider might help. Another possibility would be to use ailerons and have just the elevator function on the V-tail. The instructions show how to do this. The benefit of the V-tail is that it's difficult to damage because it isn't close to the ground. If you have never experienced V-tail flight, give it a try!

## V-tail operation

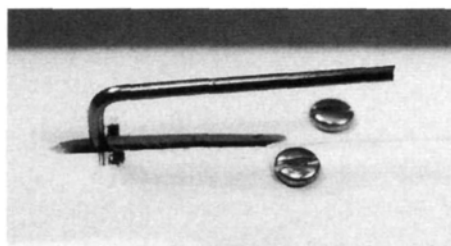


**Left: the Hitec HS-55 microservos sit side by side on two, 1/8x1/4-inch spruce rails. The 270mAh Sanyo 4-cell Ni-Cd battery pack is up in the nose along with a 3/4-ounce lead weight for ballast.**

Stick hard over for left turn

Looking from rear

**Below: only the wire towhook projects out of the bottom of the fuselage. Two screws inserted from the bottom of the fuselage hold the towhook tightly in place.**



**This is the simple towhook I made out of 1/16-inch-diameter wire, several pieces of spruce and a few, small, sheet-metal screws.**

±3/8 inch on both the elevator deflection and the rudder equivalent.

No instructions were provided for V-tail operation in either the Filip-V or Hitec manuals. For a successful first flight, get behind the Filip-V and look forward. Hold the transmitter stick hard over to the left, and note that the left ruddervator is down and the right ruddervator is up. Hold the stick to the right, and you'll see the reverse. Now move the stick for up- and

down-elevator. Both ruddervators should go up and down together. If anything is opposite to these guidelines, just flip one of the servo-reversing switches on the transmitter.

## SUMMARY

Flying the Hobby Lobby Filip-V is a lot of fun when it's lofted to altitude with the help of a short high-start. Even brief flights are enjoyable and can help to

sharpen your spot-landing skills. The occasional thermals you catch at low altitudes will only heighten your enthusiasm for this kind of flying. The model is perfectly quiet, so you won't bother anyone, and you can fly in a smaller area such as a parking lot or schoolyard. Another plus is multiple flights without any fueling or battery charging.

*\*Addresses are listed alphabetically in the Index of Manufacturers on page 150. †*





*A Speed 400 park flyer*

# the MEGA PEPPER

*by Dave Robelen*



**B**efore I list all of this new machine's wonderful features, I'll ask you some questions: are you looking for a hot stunt machine to bore holes in the sky and impress the troops with your awesome skills? Well, then you had better keep looking; Mega Pepper would bore you to tears and maybe even embarrass you. How about that burning desire to do numerous snap rolls and spins, especially down low? Forget it. Perhaps you are looking for the perfect beginner's project; well, try again.



Are you still with me? OK. I could call the Mega Pepper a park flyer and be completely correct without really saying much. The fact is, very few categories completely describe this unique new machine. What actually makes it so special? It can't be the style: this layout has been around since the 1960s. Electric RC planes are hardly new, either; even 3-channel, low-wing models go way back.

The special thing about this model is the way its ingredients are blended together. The low-wing layout provides a degree of smoothness in turbulence and excellent ground handling in crosswinds that are hard to beat. Designs such as the Pronto and Playmate, along with many others, have demonstrated that the rudder can control a low-wing model just fine,



## SPECIFICATIONS

**Model:** Mega Pepper

**Type:** sport electric

**Wingspan:** 44 in.

**Wing area:** 352 sq. in.

**Weight:** 16.9 oz.

**Wing loading:** 6.9 oz./sq. ft.

**Length:** 30 in.

**Airfoil:** Benedeck 635b

**Power:** Speed 400 with Mini Olympus gearbox

**Battery:** 7-cell 500mAh

**Speed range:** 12 to 28mph

**CG range:** 28% to 34%

**Comments:** designed by Dave Robelen, the Mega Pepper Speed 400 sport electric is built using traditional balsa-and-ply construction. This lightly loaded model has a highly undercambered airfoil and excellent flight performance. The geared motor turns a 9x5 prop and provides long flight times, especially if you catch a thermal.

thank you; in fact, a 3-channel model with rudder control generally handles better when flying near maximum lift than one equipped with ailerons. The convenience of electric power has been amply demonstrated. Finally, its efficient airfoil combined with its light wing loading make it downright easy to fly the Mega Pepper.

Equipped with a Speed 400 motor and a 7-cell battery, the Mega Pepper is unusually capable. How about a 4-foot takeoff roll in calm conditions? No sweat. Thirty-minute flights with a 500mAh battery are a piece of cake; you can fly a complete flight without leaving a 100-foot cube of sky. One of my favorite flight routines when I'm alone is just shooting touch-and-go's. Mega Pepper usually completes at least 15 circuits on one charge.

The equipment required is really quite reasonable; the motor is certainly priced right, and the prop and gearbox are economical, too. At first, I was a little put off by the Mini-Olympus gearbox because of roughness in the gears, but I had already bought it, so I resolved to fix it. It turns out that there is a fairly critical alignment between the two gears where it will run plenty smooth. You just have to fiddle with it to position the gears for best results. The Graupner\* 9x5 Slim prop does a fine job; however, you can get the same results from other wooden 9x4 props that you might have handy.

Be sure to get a battery rated for high current and rapid charging: this is not the place for bargain hunting. I use the Jeti\* 10 microprocessor ESC, which is OK, but I

wish it would taper off the power at the end of a charge instead of suddenly just shutting off the motor. Check around and see what is available. Almost any RC gear will fit the Mega Pepper, but I enjoy the lightness of the microservos, and they are ample for the task. A couple of FMA\* S-80s would be a fine choice.

So, if you are still with me, get out the tools, and let's get on with it.

## CONSTRUCTION

Because the Mega Pepper is such a docile flyer, I will try to go into a little detail, in case you are new to scratch-building. There are endless variations in balsa, so do a little selective picking. Start with the wing TE material. Look for a very straight sheet of wood—all your choices should be free of warps—that is stiff across the sheet as well as along its length. This sheet should also be a little heavier than average. The sheets for the fuselage sides and ribs should be as light as you can find while still feeling stiff. The stock for sheeting the top and bottom of the fuselage can be the very lightest. The tail sheets should be a light grade without warps. Choice of the rest of the stock is less crucial, so go to it.

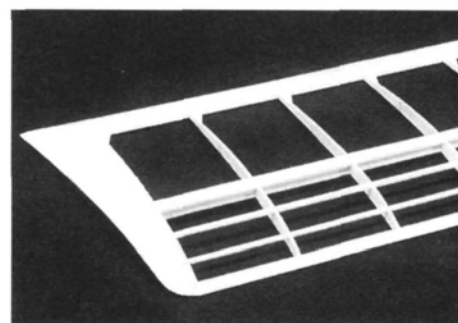
Rather than cutting out a few pieces at a time, go ahead and make a "kit" by first cutting out all the parts. After you have cut the ribs to shape, stack them and sand away any irregularities. Slice out the various wing-strip parts, and shape the TE to the wedge shape shown on the plan. Make patterns as needed, cut out the rest of the parts and set them aside.

• **Wing.** Be very sure that your board is flat, and then cover the plan with wax paper. Pin the TE strips down, being sure to block up the front with the  $\frac{3}{32}$ -inch shims. The LE goes down next, using the wing ribs to set the exact spacing from the TE. Glue all the ribs into place and note the tilt of the two center ribs. Now glue in the gussets at the rear of each rib. When the glue has dried, fit and glue all of the top spars into place along with the wingtips. Flip the wing panels over and install the webbing and bottom spar. Go

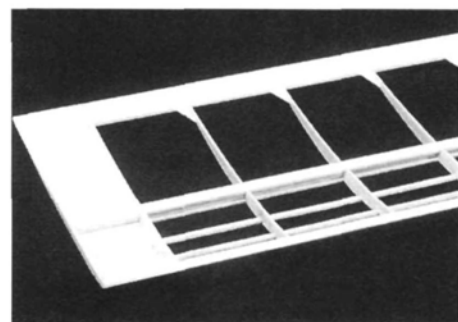
over both panels with a sanding block and shape the LE. Check the fit of the center ribs and sand carefully until the panels fit together with the proper dihedral, then glue them together. I used CA to fasten the fiberglass around the wing center, including the bottom spar and rib seam. This is really important for adequate strength!

• **Tail.** Glue the individual tail parts together now and sand them smooth, rounding the edges as shown.

• **Fuselage.** Begin by gluing the various strips to each side (one left, one right), and smooth any rough spots with a sanding block. Join the sides using the crosspieces in front and behind the wing. Work slowly and check often that the parts are square with one another. Glue the tail ends together, and check for straightness over the plan top view. Now glue in the front former and motor mount. Sand the top and bottom edges smooth before you put on the  $\frac{1}{16}$ -inch

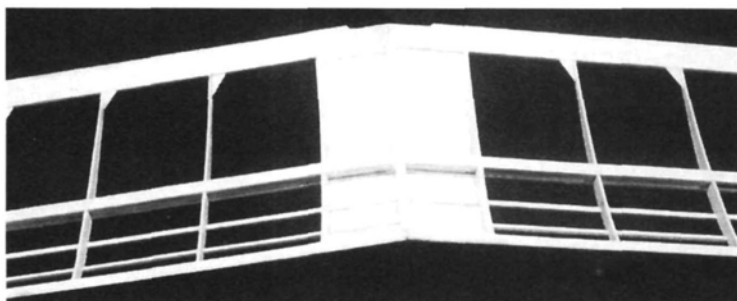


*The Mega Pepper's wing is light and highly undercambered. Here, the wingtip has been added. Note the vertical shear webbing between the main spars.*



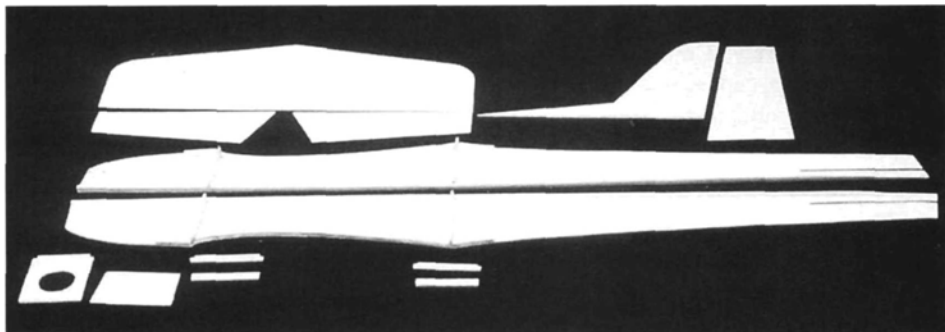
*The wing center section is sheeted on the top only. Note the small gussets at the TE of each rib.*

*Here, the wing panels have been joined. Fiberglass tape has been added to the top surface to increase strength.*

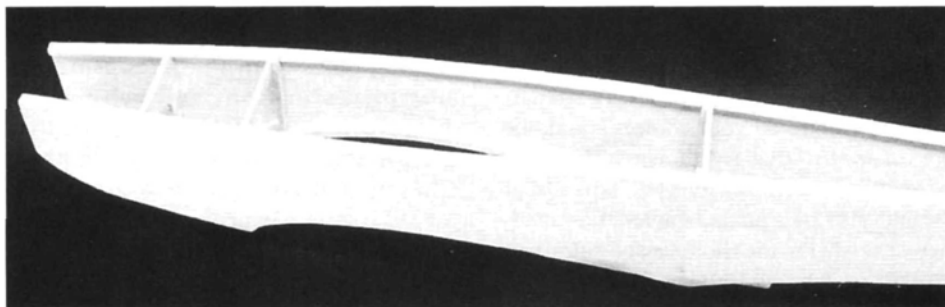




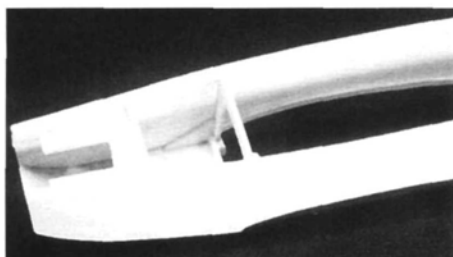
## THE MEGA PEPPER



*There aren't a lot of fuselage pieces to make; be sure to build left and right sides.*



*The fuselage sides have been joined to the formers; keep everything straight.*



*The motor-mount plate has been installed; refer to the plan for the motor's right- and downthrust angles.*

sheeting (make sure the grain runs across the fuselage). Glue on the plywood landing-gear mount and skid mount. Tack-glue the nose block into place, and sand everything until it matches the plan cross-section.

### COVERING TIME

The choice is yours: the fuselage and vertical tail may be finished either with plastic film or painted, but I strongly encourage you to consider Oracover Light\* for the wing and the stabilizer; I covered mine with it. Before you put the covering tools away, be sure the wing has the required washout on each side. Viewed from the rear, the trailing edge should be higher at the tips than at the center. Check against the plan.

Mount the landing gear now. I used small loops of soft wire and passed them through the plywood, wrapping it around the gear and twisting it tight with pliers (just like the twist-tie on your cereal). Clip the end short, fold it flat against the fuselage bottom, then finish the job with a

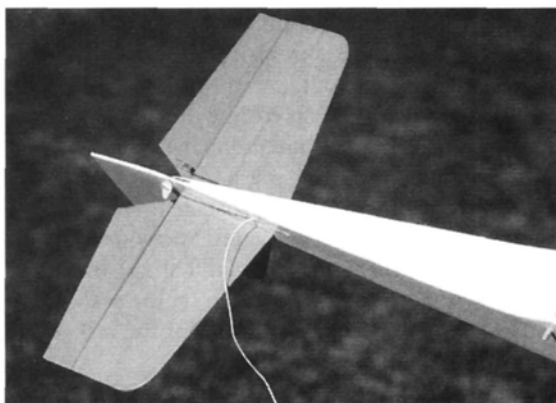
drop of CA. Attach the tailskid in the same manner.

Install the wing-mounting dowels, and strap the wing into place with two no. 64 rubber bands. Finish the horizontal tail by installing the wire joiner between the elevator halves and installing the hinges. For these lightweight models, I like to cut the hinge material into  $\frac{1}{4}$ -inch wide strips. Use CA to hold the hinges in place. Install the plywood control horn, then slide the horizontal tail into the slot and carefully check the alignment, both with the wing and fuselage centerline. Wick some CA into the joint, then glue the fin into place, watching that it is square with the wing and right down the centerline. Glue the horn into the rudder and hinge it just as you hinged the elevator.

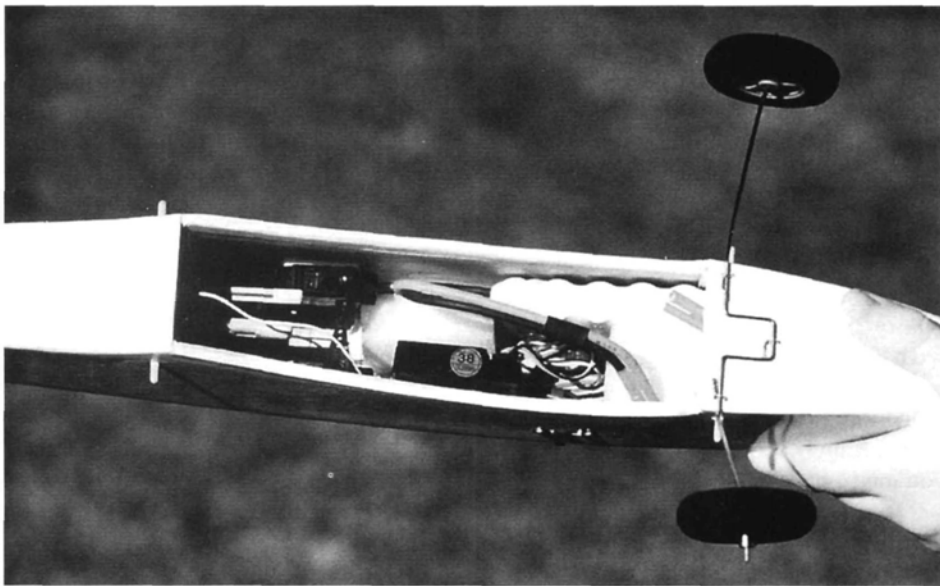
### MOTOR-MOUNTING TIME!

Cut away a section of the top planking and the nose block. Assuming you use the Mini-Olympus unit, slide it into place and mark the position of the mounting holes. I generally install these units with  $\frac{1}{2}$ -inch-long sheet-metal screws. Drill small holes to help start the screws, and fasten the motor assembly into place.

I prefer good-quality, double-sided foam tape to stick the servos to the fuselage sides. Use the trims to center the servos, and fiddle with the reversing switches until the servos operate in the correct direction. Make a couple of pushrods from  $\frac{3}{16}$ -inch-square balsa with  $\frac{1}{32}$ -inch wire fastened

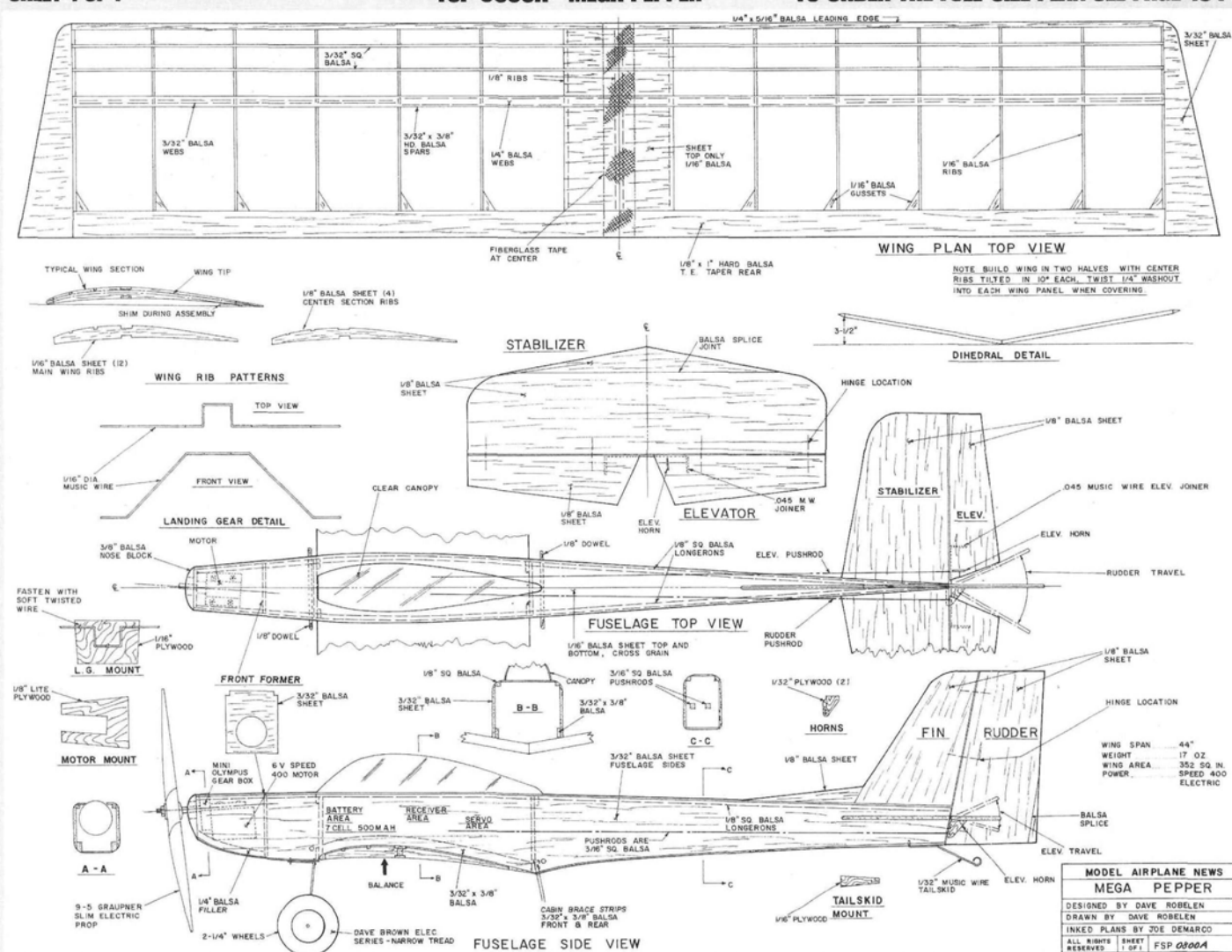


*The tail surfaces are made of  $\frac{1}{8}$ -inch sheet balsa, and a 0.045-inch music-wire joiner connects the elevator halves. Note the plywood control horns.*



*Two FMA S-80 servos, a standard size RX and a 500mAh 7-cell pack; everything fits!*





to the ends. The best arrangement for the rods is to have them cross inside the fuselage so that they follow a straight path between the servo and the horn. Mark the fuselage sides and then carefully slice narrow slots where the rods will pass through. Slide one rod at a time through the fuse-

lage and out through the slot, and line the ends up with the servo and the horn. At the tail, bend an L in the rod and fit it into the horn. At the servo end, measure carefully and make a Z-bend to fit the servo arm. Check the neutrals and throws, and then make the remaining bend at the horn to trap the rod.

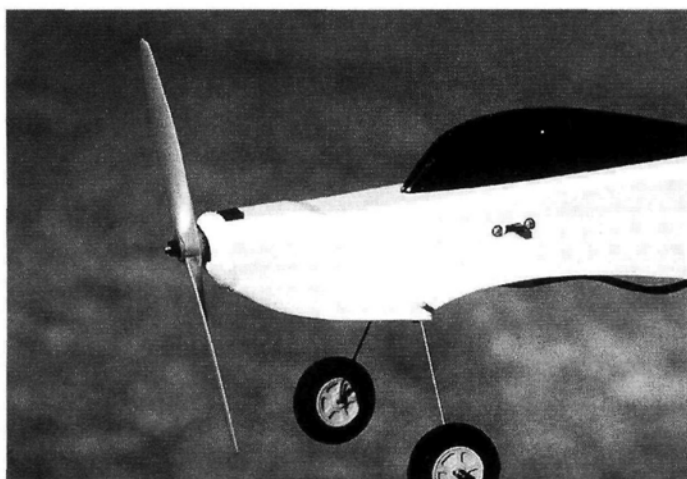
Attach the wheels, the radio switch and the prop. Slip the battery into the cabin, and strap the wing into place. This is the time to establish the balance point at the correct location. Move the battery around until the model balances at the point shown when you support it on your fingertips

on the bottom of the second wing ribs.

## TIME TO FLY

With all of your careful work at stake, please take the time to do a thorough pre-flight, making sure that the controls move in the correct directions, the wing has the correct dihedral and the balance is correct. Even though Mega Pepper can handle a moderate breeze, try to wait for reasonably calm conditions for that first flight. If at all possible, start with an ROG takeoff from a smooth surface and with plenty of open space. Mega Pepper should lift off with little more than 1/2 throttle and have a decent rate of climb at this power setting. Once you get some sky under it, carefully set the trims for straight and level, and then enjoy! If you have any questions or comments, please contact me care of the magazine and I will try to help.

\*Addresses are listed alphabetically in "Featured Manufacturers" on page 150. ✈



The Speed 400 motor is equipped with a Mini-Olympus gearbox and turns a Graupner 9x5-inch Slim prop.



# PLANES WORTH MODELING

## 3-View Documentation for Scale Modelers

### Sopwith Camel F.1



**T**HE FIRST WORLD WAR saw the advent of the airplane as a viable military weapon. In only a few short years, military aircraft advanced from rudimentary flying craft to efficient, lethal machines. During this time, aerial superiority over war-torn Europe changed hands as often as new designs were introduced. In 1916, the Germans controlled the skies over the trenches, and the British developed several fighter aircraft to regain control of the air war. The best and most famous of these designs was the Sopwith Camel. Small and



*The Camel has four large ailerons that are actuated with cables and pulleys from the control stick.*

### SPECIFICATIONS

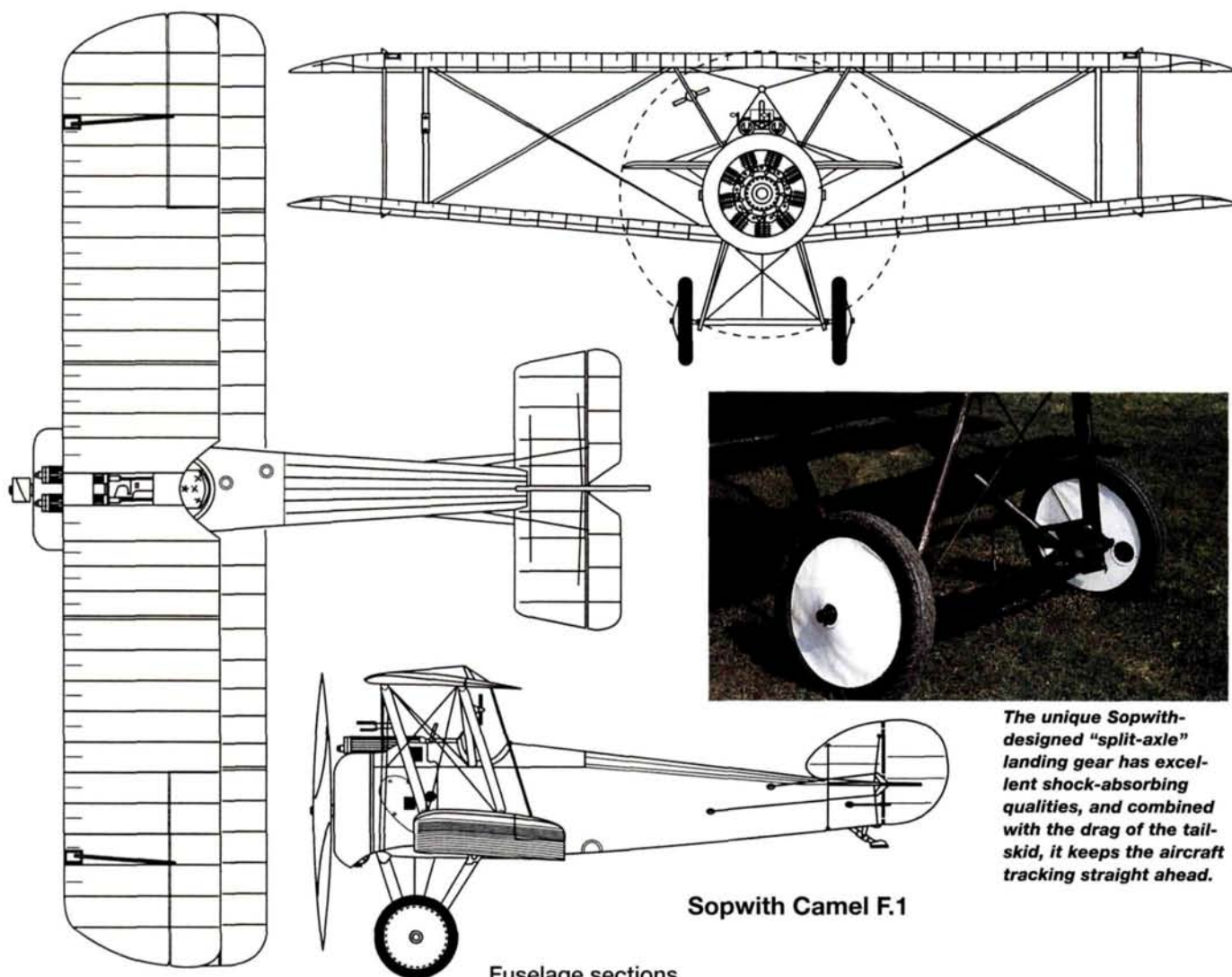
**Engine:** Gnome 9-cylinder rotary 150hp  
**Armament:** two Vickers .303 machine guns  
**Wingspan:** 28 ft.  
**Length:** 18 ft., 9 in.  
**Height:** 8 ft.  
**Max. takeoff weight:** 1,482 lb.  
**Manufactured by:** Sopwith Aviation Co.  
**Maximum speed:** 115mph  
**Range:** 290 miles  
**Service ceiling:** 19,000 ft.

lightweight, the Camel represented the state-of-the-art fighter aircraft design for its time. The Camel shot down 1,294 enemy aircraft during World War I—more than any other Allied fighter. It was so difficult to fly, however, that more men lost their lives while

flying the Camel in combat. The first Camel rolled off the Sopwith assembly line in December 1916 and went into action in June 1917 with the 70th Squadron, Royal Flying Corps, and the Royal Naval Air Service's Squadron no. 4. In the hands of an experienced pilot, the Camel was highly maneuverable, and at its best combat altitude—12,000

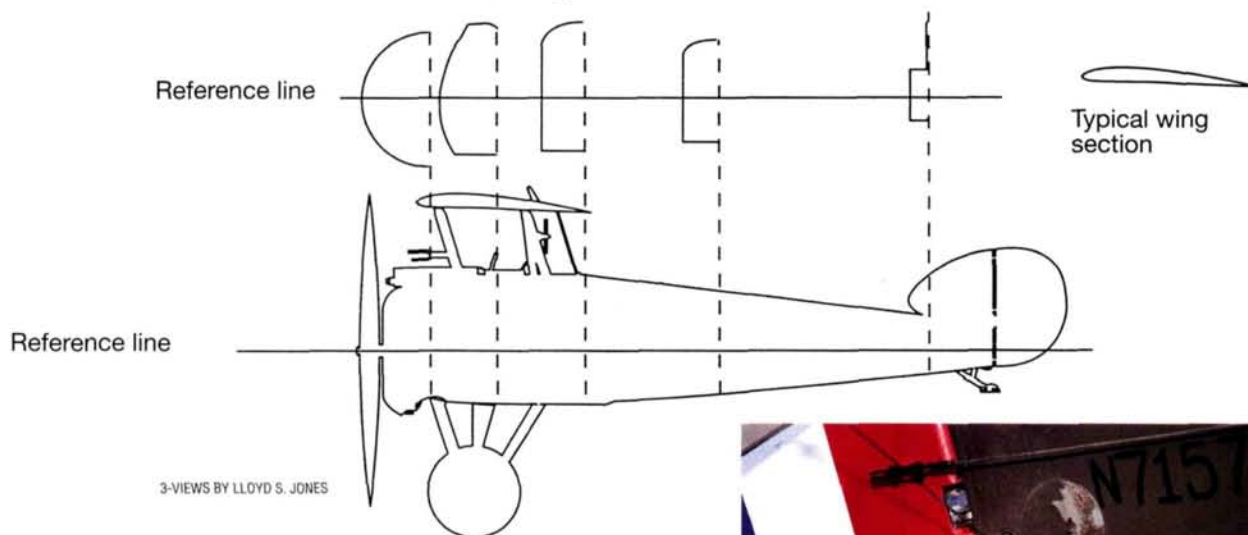
feet—it was very difficult to defeat in a dogfight. Although it owed much of its design to earlier Sopwith aircraft, such as the Tabloid, Pup and Triplane, the Camel was a revolutionary machine in a number of respects. Its twin Vickers machine guns were mounted side by side in front of the cockpit—a first for British fighters and a design feature that became standard on fighters for nearly 20 years. In service, the Camel proved to be a huge success, despite its high training-accident rate. Camels fought all along the Western Front and were also used as night fighters and observation-balloon busters. Some of the earliest fighters used by the Royal Navy were Camels that were deployed from cruisers, battleships and even from towed platforms. Camels fitted with eight air-to-air rockets were very effective fighting against German Zeppelins and long-range bombers. Although 5,490 Camels were produced, very few exist today. —Gerry Yarrish ✦





Sopwith Camel F.1

Fuselage sections



*The Camel has no brakes, and the tailskid slows it down during the landing rollout. A replaceable steel shoe at the tip of the skid digs into the dirt runway.*





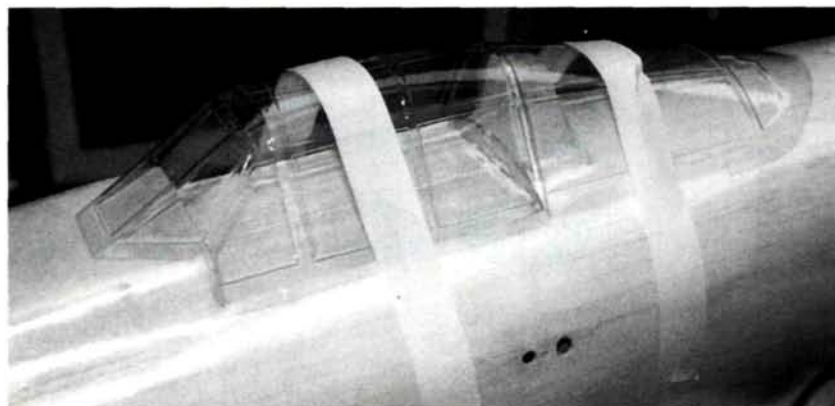
*A simple screw-down solution*

# Make a Removable Canopy

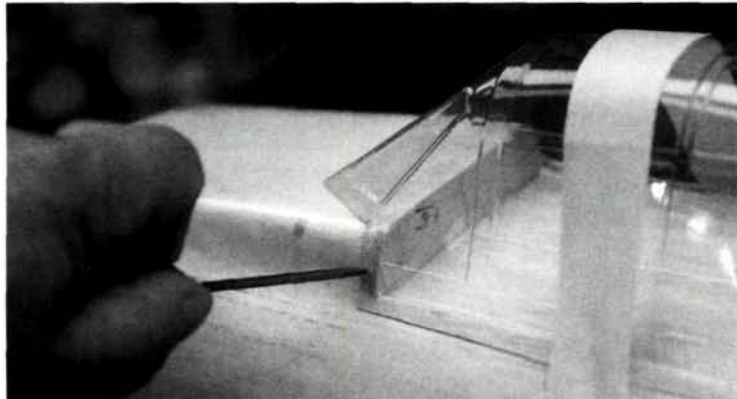
by John  
Tanzer

Once you've glued on your airplane's canopy, you no longer have access to the cockpit interior, and any flaws such as excess glue and that white "fogged" look are visible to all. If you ever need to reattach your pilot, forget it. Instead of permanently installing your canopy, use my screw-on method.

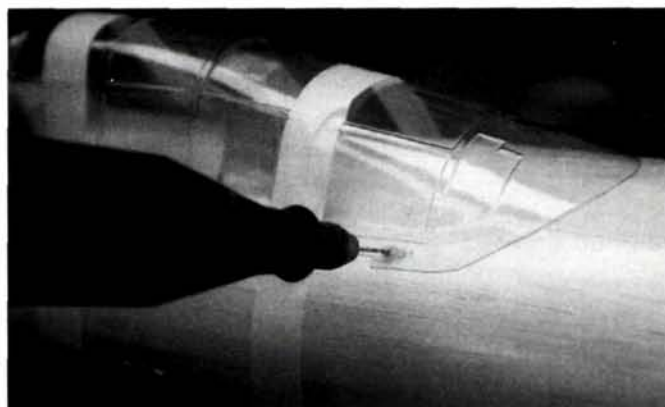
I mostly build sport and sport-scale airplanes, so a truly scale attachment is not important, but a few button-head screws around the base of the canopy look pretty good. Screws don't hold well in balsa, so I use no. 2 button-head screws and the inner yellow rod from a red Nyrod as an insert. The screws go in tightly and won't vibrate loose.



**1** After you've trimmed the canopy (there's usually a scribed cut line) the first step is to tape it to the fuselage.



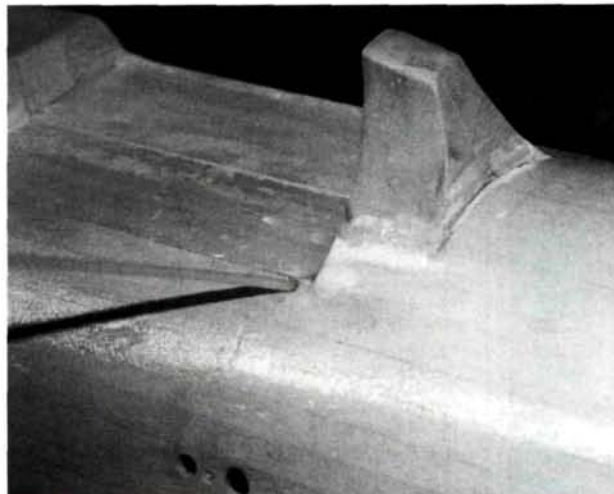
**2** Use a sharp object to mark the locations of the screw holes. Space the holes evenly with enough screws to properly secure the canopy.



**3** Drill  $\frac{1}{16}$ -inch-diameter holes at the marked points. Be sure to drill the holes straight down so that the screws won't deform the canopy sides when they're tightened down.

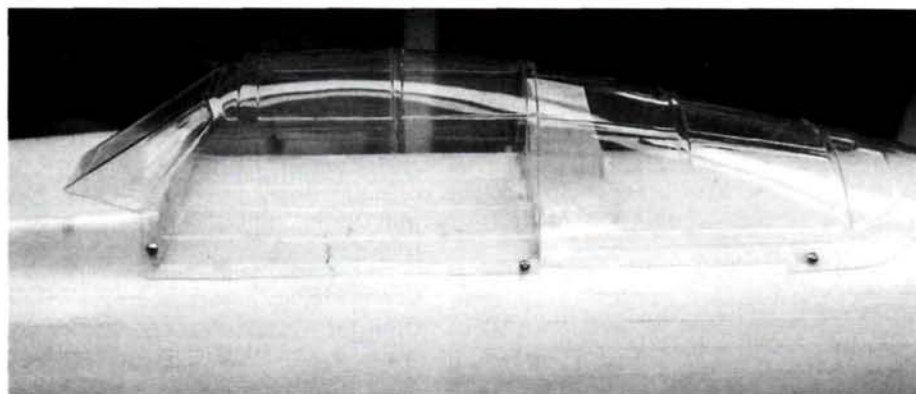


**4** Remove the canopy and enlarge the holes in the balsa using an  $\frac{1}{8}$ -inch-diameter drill bit. Make each hole at least  $\frac{1}{2}$  inch deep.



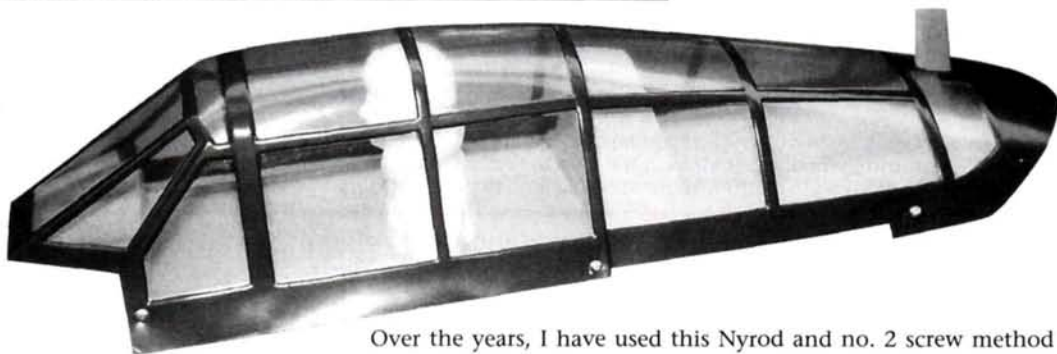
**5** Next, insert the lengths of Nyrod about  $\frac{1}{2}$  inch into each hole, and glue them into place with thin CA.





**6** Trim the Nyrod with a sharp razor or a no. 11 hobby blade, leaving some protruding to act as a standoff and prevent the canopy from being distorted at its mounting points. Test-fit the canopy; you may have to trim the standoffs. If you do, shave the Nyrod ends a little at a time till the canopy fits just right.

**7** Finish the canopy and cockpit as desired. Step back and admire your handiwork; now you have a canopy that can be removed at any time to allow access for repairs.



Over the years, I have used this Nyrod and no. 2 screw method to mount windshields on open-cockpit planes and to fasten cowl, hatches and panels. If you need to attach anything to balsa, why not give this simple, effective method a try? +

#### SCALE WHEELS FOR SMALL TO LARGE AIRPLANES

- Rubber Compound Tire
- Low Bounce Design
- Smooth or Spoked Hub Covers
- Plastic Hub
- Replaceable Bearings
- Fits axle diameters of—1/8", 5/32", 3/16", 1/4"

#### Scale Straight Tread Wheels

Item	Diameter
10	2"
111	2.25"
112	2.5"
113	2.75"
114	3"
115	3.25"
116	3.5"
117	3.75"
118	4"

#### Scale Diamond Tread Wheels

Item	Diameter
129	2"
130	2.25"
131	2.5"
132	2.75"
133	3"
134	3.25"
135	3.5"
136	3.75"
137	4"

# hubba hubba hubba

Scale Hubs & Wheels

How Big Do You  
Want Them —  
Sizes 2" to 6"

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#### SCALE WHEELS FOR LARGE & GIANT AIRPLANES

- Low Bounce Tires
- Available in 8 or 10 Spoke
- Replaceable Bearings
- Tough Outer Skin & Softer Inner Core
- CNC Machined Aluminum Hubs

#### Straight Tread Wheels

Item	Dia.	Spoke
13840A1	4"	8
13840A2	4"	10
13845A1	4.5"	8
13845A2	4.5"	10
13850A1	5"	8
13850A2	5"	10
13852A1	5.25"	8
13852A2	5.25"	10
13855A1	5.5"	8
13855A2	5.5"	10
13860A1	6"	8
13860A2	6"	10

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# Build a Portable Dremel Drill Press

by Joe Beshar

**H**ow would you like a portable drill press that you can use in the shop or at the field? The press is made with Dremel's\* cordless rotary power tool; I've found that when I use the rotary tool without a guide, it can be difficult to drill at a 90-degree angle. Since the angle is estimated, the drill tends to drift, and the hole usually ends up shaped like a crooked oval. By mounting the rotary tool on a sliding carriage guided by two parallel steel rods, you create an accurate, stable and transportable drill press.

## Add precision to your Dremel

### INSTRUCTIONS

To ensure the accuracy of alignment and correct drill operation, it is extremely important to follow these steps in order.

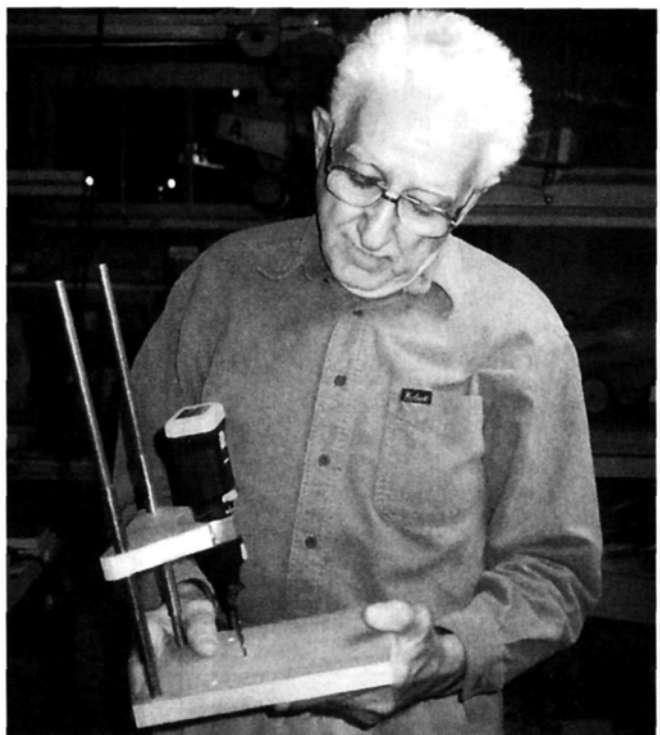
Cut the drill and carriage bases out of  $\frac{3}{4}$ -inch cabinet-grade birch. Drill the  $2\frac{1}{2}$ -inch diameter holes in the carriage base where shown on the plan. Clamp the drill and carriage bases together (with the carriage base on top). For a drill bushing, place a 2-inch length of  $\frac{1}{2}$ -inch-o.d. by  $\frac{3}{8}$ -inch-i.d. steel tube in the  $\frac{1}{2}$ -inch drilled

hole of the carriage. Drill through the drill base using a  $\frac{3}{8}$ -inch bit (the steel tube acts as a bushing to correctly align the carriage guides). Repeat the procedure for the second  $\frac{3}{8}$ -inch base hole. Epoxy two 15-inch lengths of  $\frac{3}{8}$ -inch-diameter steel rod into the drill base. Cut two  $6\frac{3}{4}$ -inch lengths of steel tube, and epoxy them into the carriage base so they protrude 3 inches on either side. Bend and drill the aluminum bracket as shown.

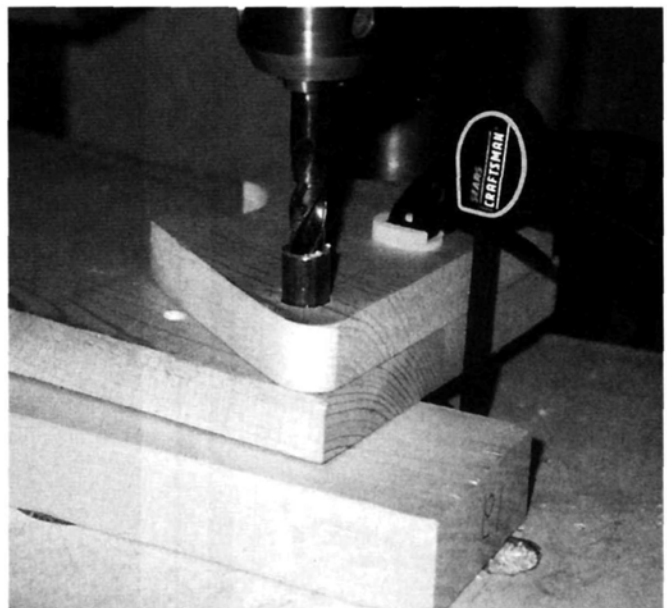
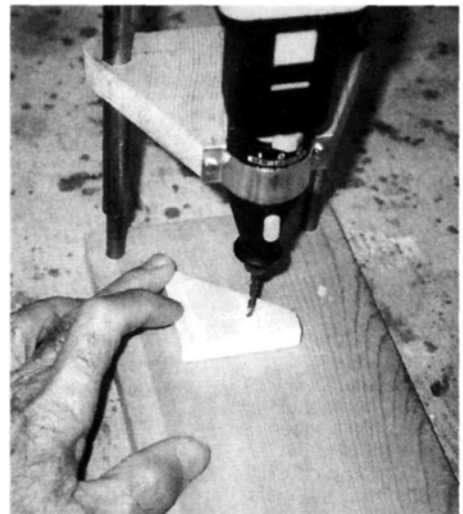
Mount the Dremel tool using the bracket and two pan-head screws. To complete the portable press, slide the carriage assembly onto the two steel rods.

### EDGER

With the addition of an edger fence, you can edge-sand sheet wood or even do routing. Cut the slots and drill the holes in the  $\frac{3}{4}$ x2x12-inch wood fence as shown on the plans. Drill two  $\frac{1}{4}$ -inch and one  $\frac{5}{8}$ -inch hole as shown. Assemble the fence with two  $\frac{1}{4}$ -inch-diameter carriage bolts and fasten them with washers and wing nuts. Insert a drum sander or a router head into the Dremel and lock it at



PHOTOS BY JOE BESHAR



To ensure correct rod alignment, clamp the carriage base on top of the drill base and drill them together.

### WHAT YOU'LL NEED

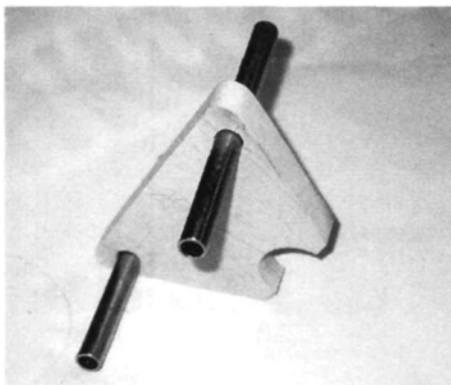
- $5\frac{1}{2}$ x12-inch piece of  $\frac{3}{4}$ -inch birch (cabinet-grade).
- $\frac{1}{2}$ x16-inch length of  $\frac{3}{8}$ -inch-i.d. steel tube.
- 30-inch length of  $\frac{3}{8}$ -inch steel rod (make sure that the steel rod fits snugly into the steel tube; purchase them together, and check for the best slip fit—available at Home Depot or Sears' hardware department).
- $\frac{3}{4}$ x4-inch strip of .025 aluminum.
- $\frac{1}{2}$ -inch long pan-head screws (2).

For edger attachment:

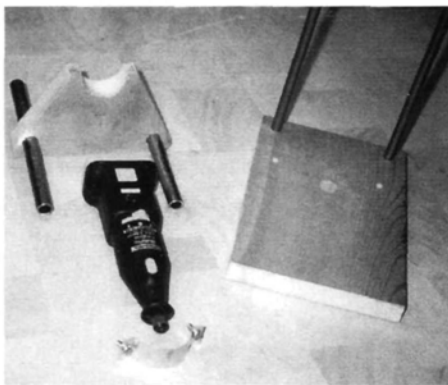
- 2x12-inch piece of  $\frac{3}{4}$ -inch birch (cabinet-grade).
- $\frac{5}{8}$ x $\frac{3}{4}$ -inch wooden dowel plug.
- 2-inch-long  $\frac{1}{4}$ -inch carriage bolts (2) with washers and wing nuts.



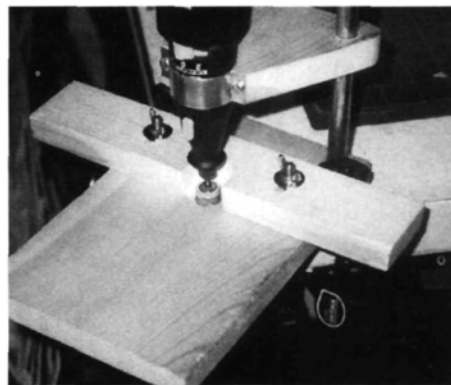
# BUILD A PORTABLE DREMEL DRILL PRESS



The carriage base is guided by a pair of  $\frac{3}{8}$ -inch-i.d. steel rods.

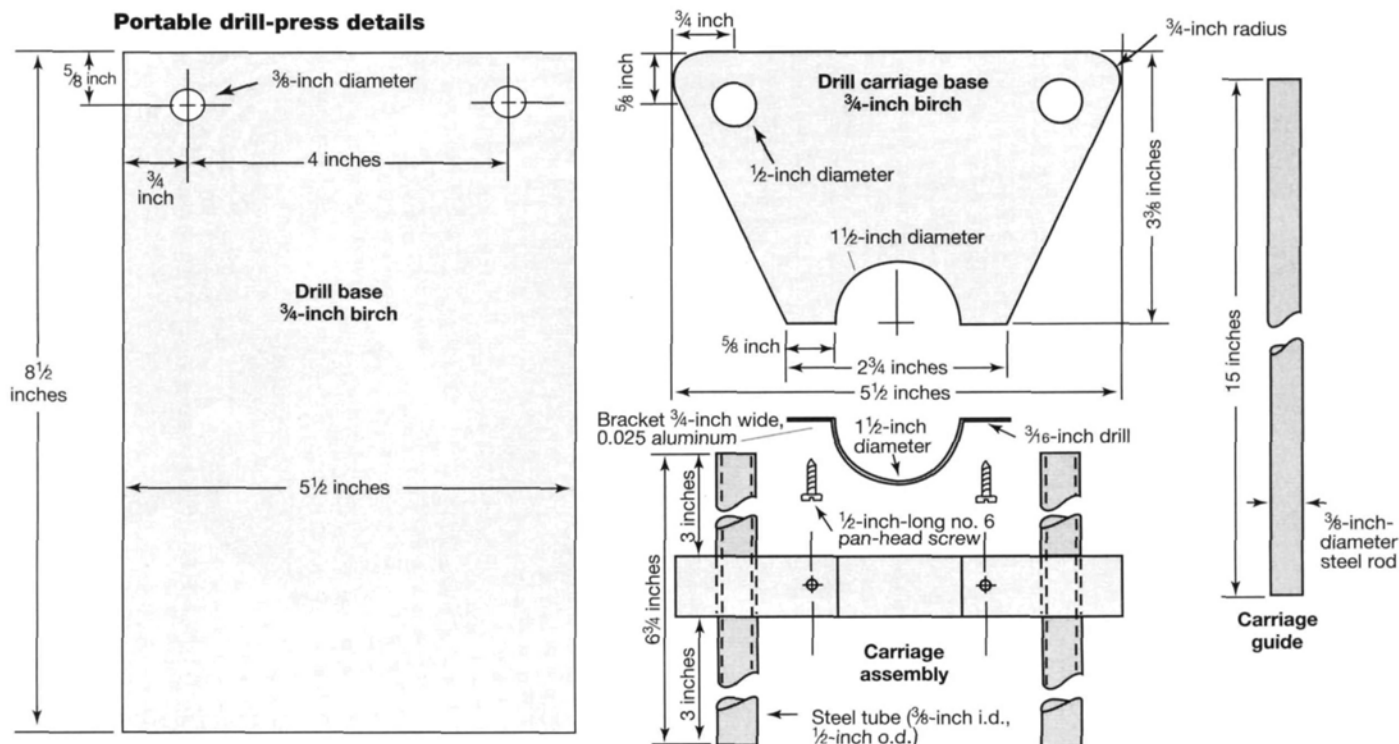


Attach the Dremel to the carriage base with a strip of .025 aluminum and a pair of pan-head screws.

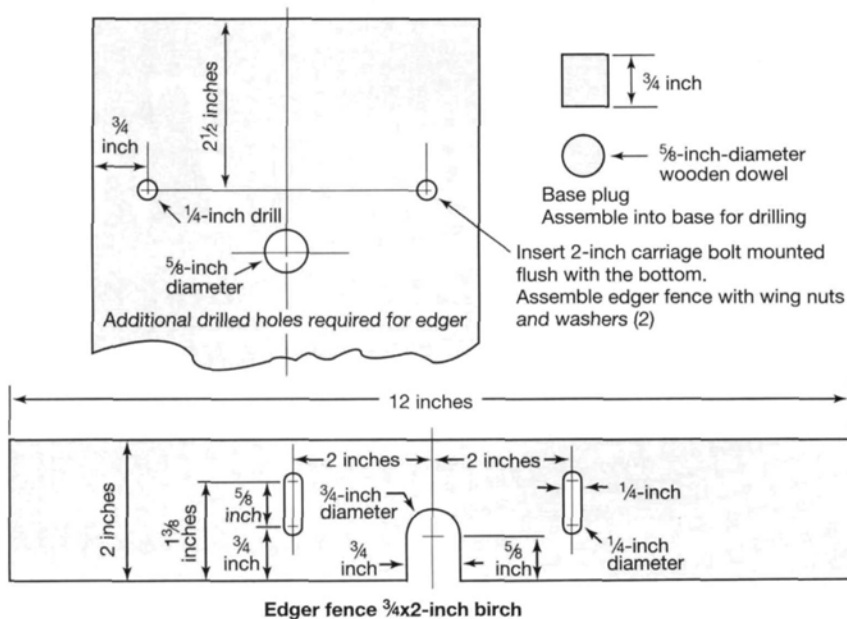


Create an edger/router by adding this fence to the portable drill press.

## Portable drill-press details



## Fence attachment for edging and routing



the desired height by tightening the wing nuts. To use the tool as a drill press, remove the fence and place the  $\frac{5}{8}$ -inch wood plug in the base's hole.

If you don't need portability, use the standard rotary Dremel Multi-Pro 110V model. Change the diameter of the carriage base cutout and bracket diameter to  $1\frac{13}{16}$  inches.

The Dremel is a wonderful shop tool that you'll enjoy even more with the added accuracy. This portable drill press is great in the workshop and for repairs at the flying field, and your flying friends will thank you for sharing it!

\*Addresses are listed alphabetically in "Featured Manufacturers" on page 150. ✦





## Toledo tidbits and foam wing construction

I always enjoy the Weak Signals model expo in Toledo, OH. This show is one of the big events for scale modelers and manufacturers to show off their latest creations. Here are some of the neat scale things I saw at this year's expo.

### BALSA USA 1/4-SCALE PUP

One of my all-time favorite WW I biplane fighters is the Sopwith Pup, and one of my favorite RC kits is the Balsa USA\* 1/8-scale version of the same plane. In a great example of "corporate downsizing," Balsa USA now introduces a smaller, 1/4-scale version of the Pup that has a wingspan of 77 inches and just under 2,000 square inches of wing area. It is ideally suited to the popular .90 to 1.20 4-stroke glow engines and to a Zenoah G-23 gas burner. With a flying weight of from 12 to 14 pounds, the little Pup will undoubtedly become as popular as the older, tried and true 1/8-scale version.

### BVM F-100D

For a true jet jockey, the new F-100D Super Sabre from Bob Violett Models\* is a dream come true. Intended for turbine power, this new, all-composite aircraft has all the fine details and panel lines molded in, and it also has operating LE slats for super-slow-speed stability. The IMAA-legal F-100 is 83.5 inches long, has a 69-inch span and more than 1,200 square inches of wing area. Suitable turbine powerplants for the Super Sabre are the RAM 1000, AMT Pegasus and the Jet Cat P-120. Scale landing gear, tires, brakes, wing tanks and pylons are also available for this beautiful, single engine jet.

### DYNAFLITE DHC-1

Distributed by Great Planes\*, the new Dynaflyte de Havilland DHC-1 Chipmunk was a nice surprise. The new 1/8-scale, all-wood, British WW II trainer has an impressive 89-inch span and it has all-wood construction. The model features scale fuselage cross-sections and is intended for a 1.08 2-stroke glow engine, a 1.20 to 1.80 4-stroke or a 25cc gasoline engine. The one I saw at the show was outfitted with flaps and Robart\* shock-absorbing Robo Struts, so you know this model lands like a dream.

### A NEW MEW GULL

No, the Percival Mew Gull is not a new

Pokémon character seen on Saturday morning TV; it is, however, a beautiful Golden Age racer from our friends at DL Modelers\*. The Mew Gull has a 72-inch span and an impressive epoxy/glass fuselage. The kit also features sheeted-foam wings, glass cowl, formed pants and canopy and full-size plans. Intended for 1.20 to 1.80 4-stroke glow engines, this beauty has "performance" written all over it!

### THUNDERBOLT GEAR

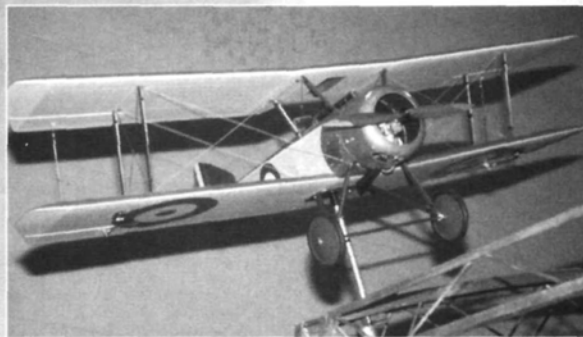
I also stopped by the Century Jet Models\* booth: the company's newest trinket is a beautiful set of retractable landing gear for

the giant-scale Top Flite P-47 Thunderbolt. Machined of steel and aluminum, these compact, pneumatic gear fit nicely into the P-47's wing. A retractable tailwheel unit completes the package.

### PLATT PERFECTION

I have always been impressed by the quality and craftsmanship of all the models in the Toledo static display competition, and this year was no different. I was particularly impressed with Dave Platt's entries: in Designer Scale—a Japanese Val dive bomber, and in Military Sport Scale—a Miles Magister. Dave's Val was beautifully detailed

*The new 1/4-scale Sopwith Pup from Balsa USA is a very attractive model for anyone interested in WW I aircraft.*



*BVM's F-100D Super Sabre is a big, IMAA-legal jet intended for turbine power. The all-composite aircraft is loaded with molded-in details.*

*Dynaflyte's Chipmunk is a great way to enter the giant-warbird scene. The British primary trainer has an 89-inch span.*





and included everything you'd expect on a Platt model: scale hinging on all control surfaces, a centerline bomb release and under-wing dive brakes, to boot! The canopy is fully functional and, naturally, the interior is completely detailed. Dave's Val earned him second place.

The Miles Magister—the British counterpart of the U.S. PT-19—was used as a primary trainer in the RAF. Dave's Magister beautifully replicates the all-wood trainer and includes a scale, functional engine cowl with hinged side-access panels, shock-absorbing landing gear and scale hinging. Dave painted his model with a new, water-based paint from Nelson Hobby Specialties\*, and it looks great! Earning Dave a second-place finish, the 1/4-scale Magister has a 102-inch span and is powered by a Moki\* 2.10 2-stroke glow engine turning a 20x10 prop.

Dave also entered his turbine-powered

Hawker Hunter in the Jet category and took third place.

## FOAM WING CONSTRUCTION CONTINUED

In the April 2000 issue, I showed how to install retracts in a foam wing panel, and several readers requested more information on foam wing construction. This time, I will show you the basics of cutting out your flaps and ailerons and reinforcing the wing's dihedral joint.

I like to work with each foam wing panel separately and do all the construction tasks to each before I join them. It is easier to add and shape the wingtip block, install the landing gear, the control surfaces and servos individually than to deal with a whole wing.

Install and shape the wingtip block before you mark the locations for the flap and aileron hinge lines. Refer to your scale documentation for proper placement, and

also mark the ends of the control surfaces. I use a fine-tip felt pen and a steel ruler to make the cut lines straight and crisp.

From the aileron hinge line, measure forward 3/8 inch and draw a second line parallel to the hinge line. This new line is where you'll cut the wing to form the aileron. The cut line is 3/8 inch forward of the hinge line so you can install a new 3/8-inch-thick balsa trailing edge in front of the control surface. This allows sufficient material to glue the hinges into. Also, measure back 3/8 inch from the hinge line and mark another parallel line. Remove this portion of the aileron and replace it with a 3/8-inch-thick balsa LE, again to provide support for the hinges.

For the flap, measure 1/2 inch in front and behind the hinge line, and use 1/2-inch-thick balsa for the LE and TE pieces. On the side edge lines of the flaps and ailerons, make some allowance so you can face the ends of the wing cutouts and the side ends of the control surfaces with 1/8-inch balsa. I like to have a 1/16-inch gap between the flap and aileron after I have faced their ends with balsa. Use white glue or aliphatic resin to glue the LE and TE pieces into place (tape them in place until the glue dries). Then remove the tape and use a razor plane and sandpaper to blend the new LE and TE flush with the wing's top and bottom surfaces. Do the same to the end sheet pieces.

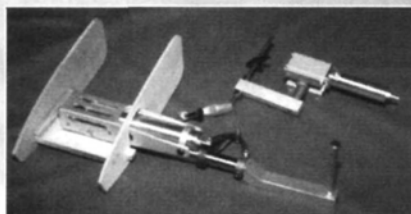
Bevel the LE of the control surfaces and hinge them to the wing. That's it. In a future column, I'll talk about making and installing scale hinges.

## JOINING THE PANELS

Once your panels are completed, join them to form the completed wing. Place the panel on the bench so that the root end is even with the edge of the bench. Block up the panel's tip so it is at the proper dihedral angle, and then sand the root end with a large, flat sanding block until it is perpendicular to the top of the bench. Now do the same to the second wing panel.

Place the panel's root ends together and check for proper fit. Once you are satisfied with the fit, determine the locations for the vertical plywood dihedral braces and draw them on the top of the panels. Make sure they won't interfere with the landing gear or other wing-mounted hardware. I prefer to use two 3/16- or 1/4-inch aircraft-grade-plywood dihedral braces. For my Meister Scale\* Bf-109, I used a 12-inch-long brace at the rear and a 6-inch-wide brace at the front to clear the landing-gear retract installations.

Cut away the balsa wing sheeting at



**Century Jet Models now offers these good-looking retracts for the Top Flite giant-scale P-47 Thunderbolt.**



**Intended for 1.20 4-stroke engines, the Percival Mew Gull by DL Aeromodelers is a foam and fiberglass beauty with a 6-foot wing.**



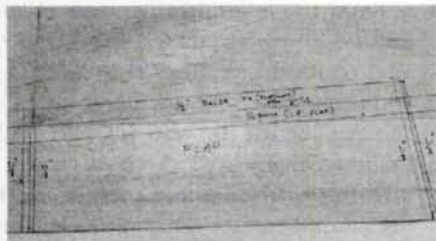
**The Japanese Val dive bomber is seldom modeled; leave it to Dave Platt to do it right!**



**Also built by Dave Platt, this Miles Magister will be Dave's competition model for Top Gun 2000. Nice!**

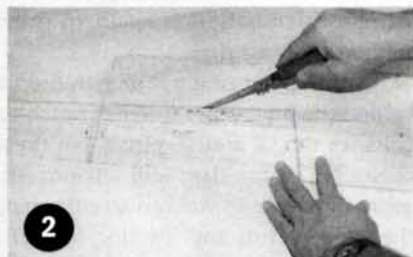
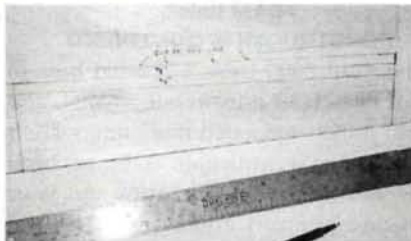


## FOAM WING CONSTRUCTION CONTINUED



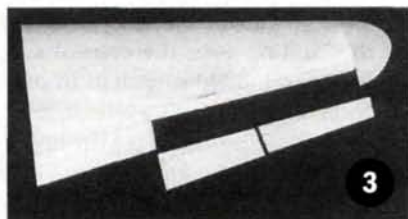
1

To make flaps and ailerons for a foam wing, cut them out of the assembled wing panel. Use your scale documentation for proper location, and then draw the hinge lines for the control surfaces directly on the wing.



2

When you have drawn the cut lines on the wing panel, cut the control surface from the wing with a long razor saw. To free the control surface from the panel, you also have to cut the side ends for each surface.



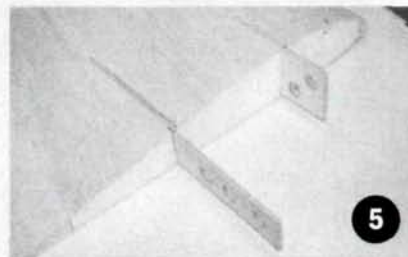
3

With the balsa LEs and TEs added to the flap, aileron and wing panel, you can fit the surfaces into place and then add end pieces to the control surfaces to complete their construction. Allow a 1/16-inch space between the flap and the aileron.



4

Before joining the completed panels together, sand the root end of each panel to the proper dihedral angle. Once this has been done, you can cut the slots in the panel so you can insert the plywood dihedral braces.



5

Here, the braces have been inserted into their respective slots, and we are now ready to join the panels. Note the holes I cut in the brace; this is to lighten them and to make a better "grip" for the epoxy.

each brace location, and then cut away the foam with a long razor saw, or do as I did: use a foam-melting wire attached to a soldering iron. Once the slots for the braces have been cut, align them with each other and tape the panels together. Place a piece of stiff paper or cardboard in the slots, and trace the wings' top and bottom surfaces to establish the shape of the braces. Use the paper templates to make the plywood braces, and then fit the braces into the slots.

The ends of the panels should fit tightly against each other, and the braces should fit snugly into their respective slots. If everything fits OK, mix some 30-minute epoxy and glue the two wing panels together; coat the

braces well with the adhesive and set them into the slots. Tape the two panels together and make sure the LEs and TEs of each panel match each other. Wipe away the excess epoxy, set the panels aside, and let them cure for 24 hours.

When the epoxy has cured, all that's left is to fill in above and below the braces with balsa and some filler material, then sand the wing smooth.

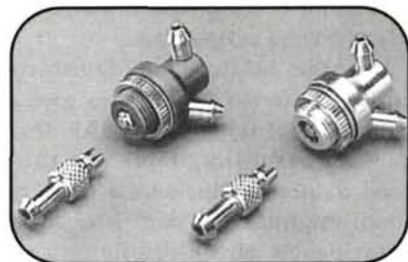
If you have any questions, please send an SASE to me c/o *Model Airplane News*, 100 East Ridge, Ridgefield, CT 06877, or email me c/o the magazine at [man@airage.com](mailto:man@airage.com).

Until next time.

\*Addresses are listed alphabetically in "Featured Manufacturers" on page 150. ✦

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# PRODUCT WATCH

*Editors' picks of the month*

**AT MODEL AIRPLANE NEWS,** we not only tell you what's new, but we try it out first to bring you mini-reviews of the stuff we like best. We're constantly being sent the latest support equipment manufacturers have to offer. If we think a product is good—something special that will make your modeling experiences a little easier or just plain more fun—we'll let you know here. From retracts and hinges to glow starters and videotapes, look for it in "Product Watch."

## AIR WILD HOBBIES

### Wingpak

#### No more wing dings!

When you take your giant-scale plane to the field—especially to out-of-town fly-ins—the term "hangar rash" becomes common in your vocabulary. It seems that more damage to models occurs during transport than when flying. The answer is to cushion your model against the bumps and jolts it suffers in transit. I've used homemade wing bags for a while; they work well but don't look professional. Avoid hangar rash by using Air Wild's convenient Wingpak.



Made of 600-denier polyester, these well-made, double-wing-panel bags look and feel like a garment bag. They feature an adjustable, padded shoulder strap and a soft-grip handle. Each panel is completely covered with 1/4-inch-thick closed cell foam, and there is a concealed wing-joiner-tube pocket. Transporting your wing panels is a cinch with the hook-and-loop-fastener-secured end flaps, and quick-release buckles hold the two pocket sections together for storage. There's also a zippered storage pocket for smaller items.

Available in two sizes (46 inches—\$99.95; 56 inches—\$109.95), the Wingpak is a welcome accessory for the well-traveled modeler; it's just the thing to keep your warbird or IMAC competition aircraft looking like new. —Gerry Yarrish

**Air Wild Hobbies, 17177 Gillette Ave., Building A, Irvine, CA 92614; (949) 833-8988; fax (949) 567-0966.**



## EXCEL HOBBY PRODUCTS

### Shop Clamps

#### Hold on there!

A simple but invaluable tool, these sliding clamps securely hold parts together. The jaws clamp together using a clever wedge-cam that slides into place. If you prefer, use rubber bands over the jaws to hold the clamps together. The next time you put on sheeting or join your wing halves, you'll wonder how you ever did without these. —Debra Sharp

**Excel Hobby Blade Corp., 481 Getty Ave., Paterson, NJ 07503; (800) 228-4344; fax (973) 278-4343.**

## CYBERBOND

### Hobby Adhesives

#### Happy to be stuck with you

No single item in my workshop is used up faster than glue—except maybe coffee. I recently had the opportunity to try the line of Cyberbond adhesives; if you're not familiar with the name, you soon will be. For many years, Cyberbond has manufactured industrial adhesives for full-scale aircraft and auto manufacturers world-wide, and now it has entered the hobby market. Cyberbond's fast-cure epoxy sets in just 4 minutes, and its thin CA—said to be the fastest superglue in the world—sets in less than 1 second. The full line of hobby adhesives consists of 2-Ton Epoxy (where high strength and long work time are required); Blast CA accelerator; Universal—a thicker viscosity CA for gap-filling applications; No-Odor—a fume-free, non-frosting CA; and Flex—a flexible glue and epoxy. Cyberbond's superglue remover is another welcome product; it's industrial strength—not just an acetone-based liquid.

Cyberbond can guarantee its products because it manufactures what it sells; it even guarantees your results! I'm pleased with my results so far. And I especially like the glue's screw-on caps that prevent field-box spills. —Bob Hastings



**Cyberbond, 401 N. Raddant Rd. Batavia, IL 60510; (630) 761-8900; (fax) (630) 761-8989; www.cyberbond1.com/hobby.cfm.**



# PRODUCT WATCH

## SIDEWALK FLYERS

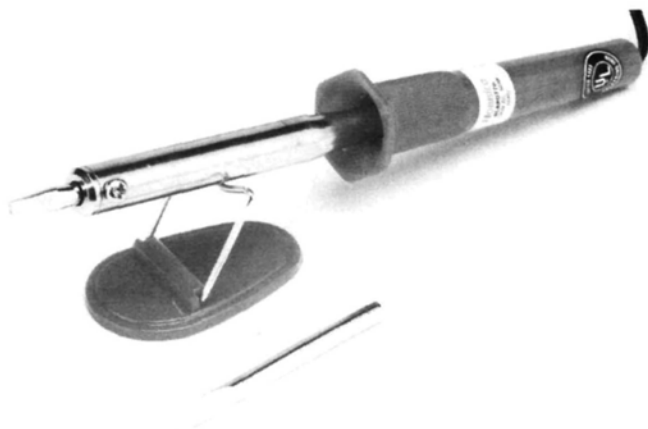
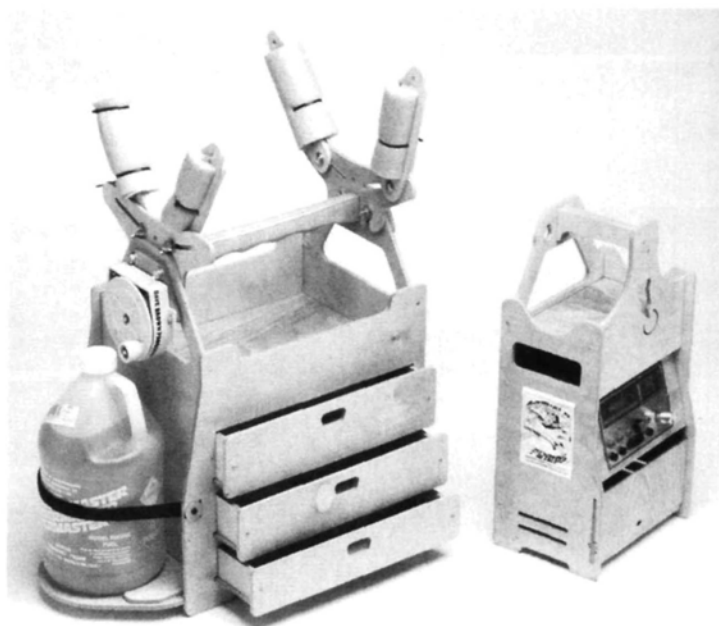
### Flight Line Chief First-class field caddy

Field box manufacturers have been trying to outdo one another for years. This is great for you and me because the result is a well-organized, portable workshop with room for all the field necessities.

It's evident that a considerable amount of thought went into creating the Flight Line Chief. The box is CNC-routed from 5-ply Baltic birch and veneer hardboard. The instructions and illustrations guide you from identifying the individual parts to component assembly and finishing. I was really impressed by the little touches, such as the supplied hardware, sandpaper, glue and stain necessary to complete the box. The Flight Line Chief includes a round base to carry gallon jugs like my Powermaster fuel and a rectangular shelf for metal cans. Retainers in the base shelf and a hook-and-loop strap hold the fuel container securely. There's even a base to mount a Dave Brown Six-Shooter fuel pump. The main section's adjustable cradles will support the largest models; they can also be folded out of the way or simply removed. Beneath the upper tier are three large drawers with dividers to separate your tools and parts. The right section of the toolbox is a portable tote that carries your starter and battery plus the supplies that you might need on the flightline. Different inserts are furnished for this unit to accommodate a variety of power panels.

The Flight Line Chief Master Toolbox represents a new benchmark in commercially available field boxes. If you've outgrown your present field box, or you just like to own the best, give Sidewalk Flyers a call. Price—\$69.95; \$56.95 without fuselage cradle. —Bob Hastings

**Sidewalk Flyers**, 836 Mason Way #1, Medford OR 97501; (541) 734-2088; fax (541) 734-0599; [www.woodcenter.com](http://www.woodcenter.com).



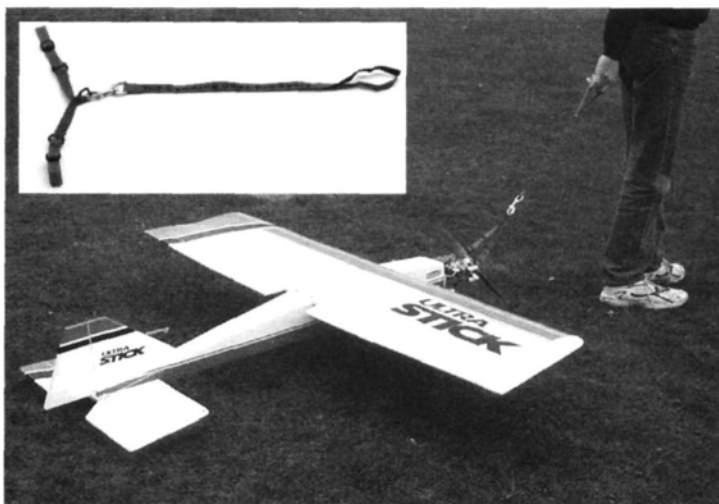
## HOBBICO

### 30W and 60W Soldering Irons Pencil-point heat

My big soldering gun heats up fast and has a nice storage case, but when I have to deal with small electrical applications, the big gun is more of a liability than an asset. Hobbico's 30W and 60W soldering irons are perfect pegboard-size tools that have enough muscle to handle most ordinary soldering tasks because of their mica heating units. Each iron has an octagonal shield that prevents it from rolling off the bench, and the 5-foot-long electrical cord lets you reach all around your projects. The irons' large, round, heat-resistant grips protect your hands while you solder, and an included sturdy metal safety stand protects the workbench top when you need to set the iron down. Hobbico includes a regular and a chisel-point tip for the 60W iron and has replacement tips for both irons. —Craig Trachten

Part no—HCAR0775 (30 watts); HCAR0776 (60 watts).

**Hobbico**; distributed by Great Planes Model Distributors, 2904 Research Rd., P.O. Box 9021, Champaign, IL 61826-9021; (800) 682-8948; fax (217) 398-0008; [www.greatplanes.com](http://www.greatplanes.com).



## TNT LANDING GEAR PRODUCTS

### Tug-n-Tow Be a leader!

TnT Landing Gear Products has a neat way of hauling an airplane around. How often have you grunted your way from the parking lot to the pits, up to the flightline, or when retrieving your plane from an "alternate" landing spot? The Tug-n-Tow RC pull strap is a durable red-webbed tether with an elastic Y-harness that loops around your plane's propeller blades. When the plane is being pulled, the elastic takes up the shock of any divots in the field. The harness can be quickly released with its spring-loaded clasp. Towing my plane without having to bend over is a big relief on the ol' back! —Roger Post  
Price—\$14.95.

**TNT Landing Gear Products Inc.**, P.O. Box 856 Holland, OH 43558; (419) 868-5408; fax (419) 868-5409; [www.toltbbs.com/~kroggel/](http://www.toltbbs.com/~kroggel/) email: [kroggel@toltbbs.com](mailto:kroggel@toltbbs.com). ✦



# Astro Flight News

**Astro Flight Inc. Introduces five new and exciting products for the electric flyer: The new Mighty Micro 010 Brushless Motor for park flyers, a new Ducted Fan Brushless 05 Motor for the Kyosho T-33, FAI-035 and FAI-05 Planetary Motors for Sailplanes and two new surface mount digital speed controls.**

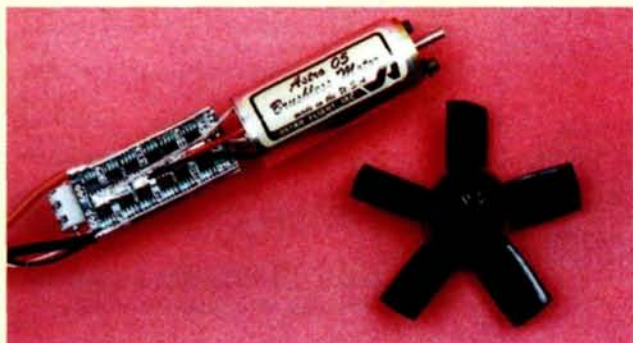
## The Mighty Micro is here!

Our new Mighty Micro Brushless 010 Motor #801 has arrived. The motor is one inch in diameter and one inch long and weighs only 35 grams with sensorless control. It spins an APC 6x2.8 prop at 9800 RPM while drawing only 2.5 amps from a six cell 350 mahr Nicad pack. Now you can fly for 5 minutes on Nicads, 10 minutes on Hydrides and one hour on lithium cells. The tiny On-Off Brushless control has Brakes and BEC. This system will work with 5 to 8 cell batteries. Perfect for models up to 10 oz.



## New Ducted Fan 05 Motor!

Our new 4 turn Brushless 05 Ducted Fan Motor #805F with 12 FET controller is specially designed to add Afterburner performance to the Kyosho T-33 and WE-Mo-Tek 480 ducted fan units. Run the T-33 fan on 8 or 9 Nicads or 10 Sanyo 3000 mahr Hydrides. The motor draws only 19 amps for 10 minute flights on Hydrides.



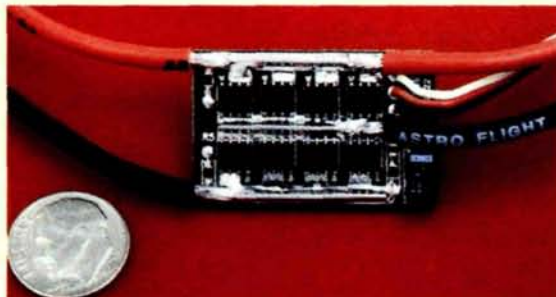
## FAI-035 with Planetary Gearbox

Our new 4.4:1 planetary gear box is now available for all Astro Cobalt 035, 05 and 15 motors. The FAI-035 with planetary gear box is perfect for 7 cell competition sailplanes. The FAI-05 with planetary gear box, shown here, is perfect for 10 cell sailplanes.



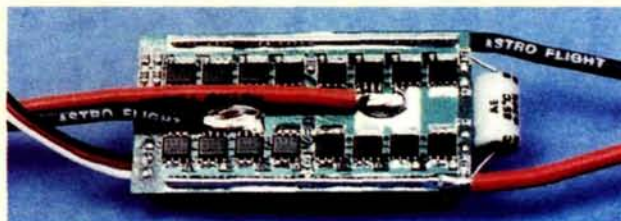
## New Astro 215D Airplane Control

The new Astro 215D Speed control uses new surface mount technology for minimum size and maximum performance. The tiny 215D weighs only 8 grams and has Brakes and BEC. It handles up to 30 amps and 10 cells. Perfect for Astro Cobalt 035, 05 and 15 motors.



## New 208D Reversing Control

The new 208D Reversing Control is designed for scale boats. It's 16 FET H-Bridge circuit gives you full power forward and reverse. The 208D weighs 1 oz and can handle 25 amps at 6 to 12 volts. It has a 2 amp BEC and a electronic current limit of 28 amps, so no fuses are needed. It was designed for tug boats and works great with 150 pound robots and electric powered blimps.



**Astro Flight Inc.** 13311 Beach Ave. Marina Del Rey, CA 90292

Phone (310) 821-6242 Fax (310) 822-6637 Web Site <http://www.astroflight.com>



# The Right Combination

by Andy Lennon

## Match your airframe, engine and prop to suit your flying skills

**T**he advertising in *Model Airplane News* reveals a large assortment of model airplane kits and ARFs of all sizes and types—some scale, some not—along with a wide variety of 2- and 4-stroke, glow and gas engines of many displacements; we also see a bewildering number of wooden and reinforced-plastic propellers of various diameters and pitches—all products of the global hobby industry.

Modelers who seek models, engines and props to suit their flying skills and styles find this profusion of choices confusing. Experts want a highly maneuverable airplane with a powerful engine that can pull it smoothly and easily through aerobatics. Beginners need a stable, slow flying model with modest power and a landing speed that allows time to correct the model's flight path. Most modelers fall between those extremes, and each has his own particular skills and flying style. Unfortunately, a beginner may choose an airplane, engine and prop combination whose performance is beyond his abilities; a crash and discouragement ensue.

Guidelines that highlight the key characteristics of various model types, engines and props are needed. Armed with this knowledge, modelers will be able to make informed judgments when making their selections and, at the same time, they'll be able to optimize their model's performance by matching its characteristics to those of the engine, or vice versa, and matching prop diameter and pitch to the characteristics of both plane and engine.

This article will provide all the above and is divided into three sections that discuss the airplane, engine and propeller.

### THE BEST MODEL FOR YOU

• **Sources.** Distributor catalogs, magazine ads, reviews and construction articles for scratch-builders suggest weights and wing areas and recommend engines, and suitable prop sizes are occasionally mentioned.

• **Weight.** This should include the weight of a full tank of fuel. How big should your tank be? Generally, 20 fluid ounces of fuel per 1 cubic inch of engine displacement (cid) works well. A .40 engine needs an 8-ounce tank (0.4x20). A fluid ounce of glow fuel weighs roughly 0.7 ounce.

Wing area (in square inches) may also be provided. If it isn't, it is easily calculated:

- Straight wing =  $\text{chord} \times \text{span}$
- Tapered wing =  $[(\text{tip chord} + \text{root chord}) \times \text{span}] \div 2$
- Elliptical wing =  $0.7854 \times \text{root chord} \times \text{span}$

The wing area in or on the fuselage is included in all of these cases.

- **Wing loading** (in ounces per square foot of wing area) is another key characteristic.

It is calculated by:  

$$[\text{Weight (oz.)} \times 144] \div \text{wing area (sq. in.)} = \text{wing loading oz./sq. ft.}$$

\*Conversion factor

- **Speed.** The maximum level flight (MLF) speed is related to wing loading. At high wing loadings, the model must fly faster, and it requires higher power to do so. Landing speeds are also higher. Low wing loadings are indicated for beginners.

A reasonably close estimate of a model's MLF speed is essential if you're to make good propeller selection, which is also a key factor in determining performance. Table 1 provides information on four

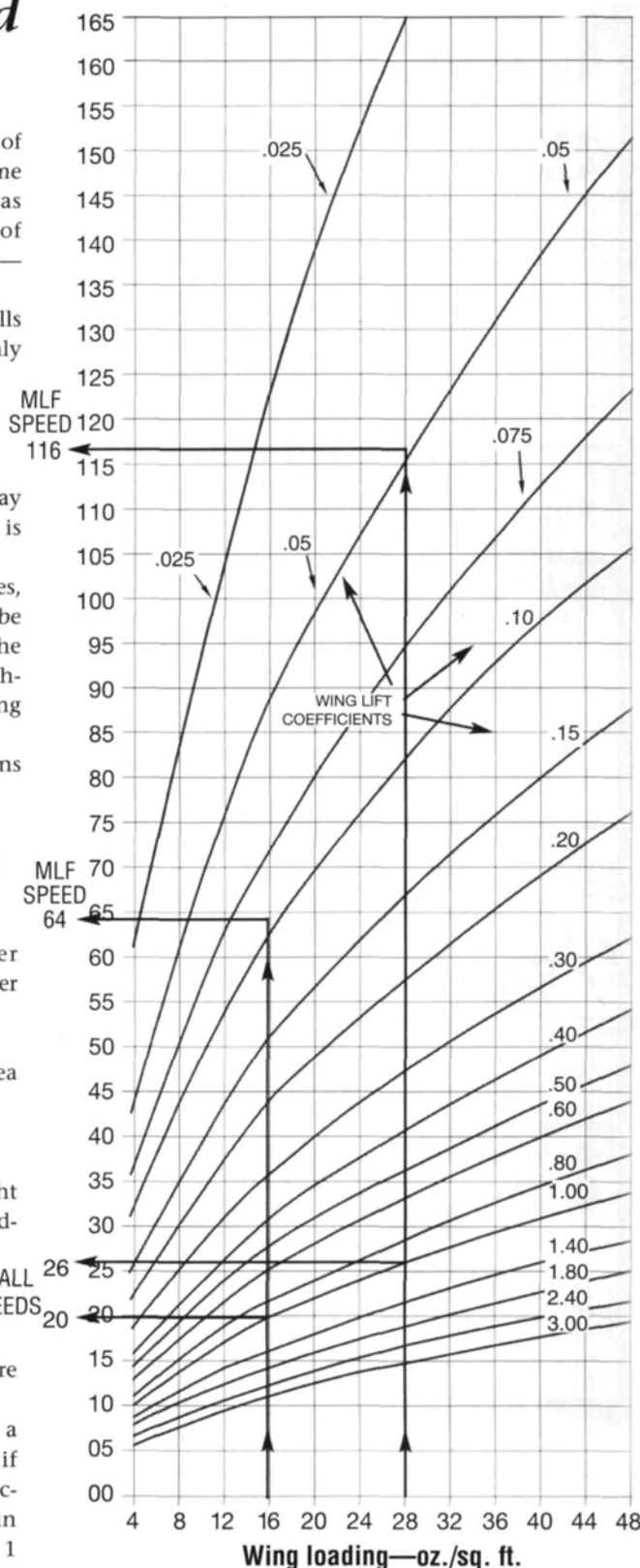


Figure 1. Nomograph for quick determination of wing loading, lift and speed.



model types. Note that the average lift coefficient ( $C_L$ ) in column C is reduced as speed is increased. This is because lift is proportional to the *square* of the speed. Double the speed, and lift is increased fourfold. At high speed, an airplane must fly at a lower angle of attack and a lower  $C_L$ .

To determine your model's speed, select the appropriate  $C_L$  for its wing loading (see Table 1) and refer to Figure 1. For example, a wing loading of 16 ounces and  $C_L$  of 0.11 has an MLF speed of 64mph. With a wing loading of 28 ounces and 0.05  $C_L$ , MLF speed is 116mph.

Column E, power loading, will be explained in the section on engines.

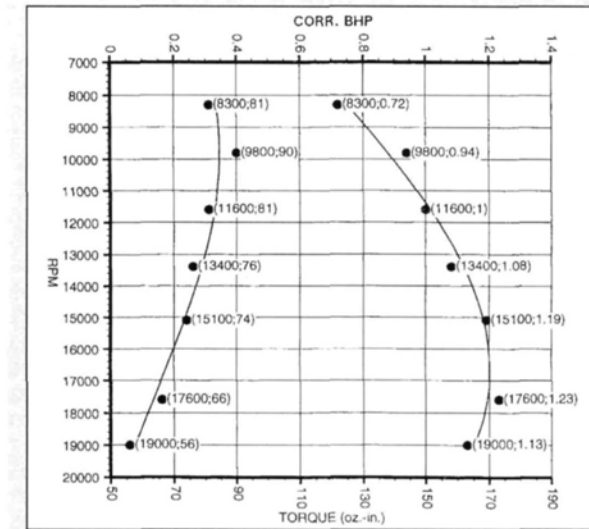
• **Stall speeds.** Model airfoils have a maximum lift coefficient of  $C_{L1}$  (or very close to it). Refer to Figure 1. With a wing loading of 16 ounces and  $C_{L1}$ , stall speed is 20mph. At 28 ounces and  $C_{L1}$ , it is 26mph.

Increasing these for approach speeds by a third provides 26mph for 16 ounces of wing loading and 35mph for 28 ounces. For beginners, 26mph is good; 35mph is no problem for the expert.

• **Scale speeds.** Scale buffs who want their models to fly at scale speeds should use Kent Walter's formula: "The square root of the scale factor multiplied by the full-scale airplane's MLF speed." For example, a 1/4-scale model of a full-scale plane that's capable of flying 150mph would fly at:

$$\sqrt{1/4}, \text{ or } \sqrt{0.25}, = 0.5 \times 150 = 75\text{mph}$$

• **Drag.** A scale model of a radial-engine biplane with interplane and cabane struts, open cockpit bracing wires and large landing gear would have high drag and would need a more powerful engine for aerobatics. The author has several models that each weigh roughly 110 ounces, have 700 to 800 square inches of wing area and are



**Magnum Pro .36 propeller performance.**

Fuel: 15% nitro; 20% lube

Propeller	Ground rpm	Ground thrust	Air rpm loop/straight	% of max. airspeed in loop (mph)	% of max airspeed (mph) straight
APC 9.5x8N*	13,500	.4 lb., 7 oz.	13,430/13,750	100/43.5	100/83.3
APC 9.5x8.5**	12,800	.4 lb., 2 oz.	12,700/13,660	98.6/42.9	99.4/82.8
APC 10x8	11,500	.4 lb., 9 oz.	11,130/11,460	93.6/40.7	93.1/78
APC 11x7	10,500	.5 lb., 1 oz.	10,060/11,500	85/37	94.5/78.7
Rev-Up 11x7	10,200	.4 lb., 8 oz.	9,780/11,750	85/37.9	88.5/73.7
Master Airscrew	9,300	.4 lb., 8 oz.	9,000/10,830	83.9/36.5	90.8/75.6

\* RAD—99.7; wet bulb—48° F; dry bulb—58° F; barometer—30 Hg.; \*\*dB at 9 ft.—98; wind speed—8–10 mph

**Figure 2. Data from Dave Gierke's review of the Magnum Pro .36 SE ABC engine (Model Airplane News, February 1994). Note the in-flight rpm and airspeed obtained by telemetry.**

**Table 1**

A	B	C	D	E	F
Model type	Speed range (mph)	Avg. $C_L$	Wing-loading range (oz./sq. ft.)	Power loading (oz./cid)	Stall speed (mph)
Expert	100 to 120+	0.05	25 to 30	100 to 200	27
Intermediate	80 to 100	0.07	20 to 25	200 to 250	23
Trainer	60 to 80	0.11	15 to 20	250 to 300	22
Glow glider	40 to 60	0.18	10 to 15	300+	17

designed for low drag. Powered by .46 engines, they perform as though powered by .61 engines.





## THE RIGHT COMBINATION

**Table 3. Model Airplane News reviews of 2-stroke engines.**

Engine	Cid	Max torque (rpm)	Max torque (oz.-in.)	Bhp	Issue*
O.S. Max .10 FSR	.10	11,000	15	0.163	Feb. 1979
O.S. Max .25 FSR	.25	8,000	40	0.317	May 1978
O.S. Max .32 SKH	.32	7,548	68	0.509	Oct. 1995
Magnum Pro .364E	.36	9,800	85	0.826	Feb. 1994
Nelson AACQ. 40	.40	18,500	137	2.51	Feb. 1996
O.S. Max .40 FSR	.40	9,000	80	0.714	Apr. 1976
MVVS GES/R .40	.40	13,100	92	1.20	May 1996
Tiger Shark .40A	.40	7,900	69	0.54	Jun. 1995
SuperTigre 545R	.4579	8,223	82	0.67	Feb. 1992
O.S. Max .46 FX heli	.46	9,000	92	0.82	Date not available
Sport-Jett .46	.46	15,850	99	1.55	Jun. 1999
MDS .46 ABC	.46	9,798	75	0.73	Jul. 1996
Enya .60XF4 Ring	.60	9,800	1175	1.14	May 1993
Webra Silverline 61	.61	6,900	120	0.82	Aug. 1996
ASP 61	.61	4,645	116	0.53	Jun. 1990
RJL K.61R/C	.61	9,500	117	1.10	May 1995
Fitzpatrick 61	.61	8,100	122	0.98	Oct. 1993
Webra Speed 70	.70	11,000	108.6	1.18	Feb. 1993
Fox Eagle .74	.74	9,600	154	1.47	Oct. 1991
SuperTigre G90	.9004	5,923	186	1.09	Dec. 1996
Saito FA 100 Flat Twin	.997	6,500	160	1.03	Mar. 1996
Webra 120	1.228	6,745	245	1.64	Oct. 1994
O.S. Max 140 RX	1.40	8,677	443	3.81	May 1997
Desert Aircraft 3W-24	1.4469	5,880	328	1.94	Sep. 1997
Irvine 150	1.5105	5,500	262	1.43	Jan. 1996
Moki 1.80 RK	1.813	4,600	410	1.87	Feb. 1995
Zenoah Quartz G38	2.288	5,040	346	1.73	Apr. 1994
Zenoah G 45	2.749	5,500	410	2.23	Oct. 1996

\*Model Airplane News

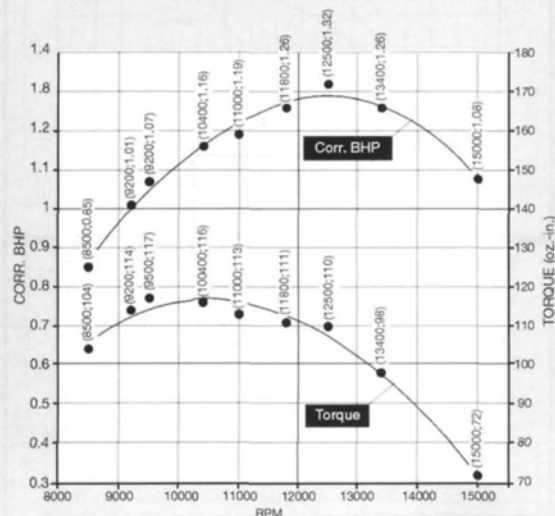
### ENGINE CONSIDERATIONS: MAKE THE RIGHT CHOICE

• **Sources.** The best sources of information are the thorough and objective engine reviews by Mike Billinton and Dave Gierke published in *Model Airplane News* and by Clarence Lee in *RC Modeler*.

All three provide tables of rpm obtained with a variety of props suitable for the engine under review. Mike and Dave both provide brake horsepower and torque curves (see Figures 2 through 6). The author considers a knowledge of these curves essential for good prop selection.

#### RJL K.61 dynamometer test results.

Rpm	Torque	Corr. Bhp	Bhp	Corr. factor	Distance
8500	.104	.085	.088	.097	2.16
9200	.114	.101	.104	.097	2.362
9500	.117	.107	.110	.097	2.43
10400	.116	.116	.120	.097	2.395
11000	.113	.119	.123	.097	2.344
11800	.111	.126	.130	.097	2.3
12500	.110	.132	.136	.097	2.275
13400	.98	.126	.130	.097	2.032
15000	.72	.108	.111	.097	1.5



#### RJL K.61 rpm obtained with a variety of props.

Propellers	Rpm
Top Flite 11x7	12,400
Master Airscrew 11x7	12,300
APC 11x7	12,600
Rev-Up 11x7	12,400
Master Airscrew 11x7.5	12,200
Zinger 11x7.5	11,600
APC 11x8	11,500
Top Flite 11x8	11,900

#### Test conditions.

Coefficient	.48.25
Wet bulb (°F)	.3.30
Dry bulb (°F)	.3.50
Bar. pressure (Hg)	.30.22
Vap. pressure (Hg)	.0.19

• **Brake horsepower (Bhp).** This is a calculated figure and reflects "time," i.e., revolutions per minute:

$$[\text{Torque (in.-oz.)} \times \text{rpm}] \div 1,008,000$$

• **Torque.** This is a key factor. Mike, Dave and this author agree that to obtain the best output of engine and prop (for all but speed events), the diameter and pitch of the prop should load the engine to rpm in its high-torque range. For example, in Figure 4, the high-torque range is shown to be from 9,000 to 12,000rpm.

Dave's propeller load factor (PLF) formula:  $\text{PLF} = \text{diameter}^2 \times \text{pitch}$  indicates that prop diameter is much more effective in loading the engine than pitch. Note also that the peak torque for most engines is obtained at lower than maximum Bhp rpm. One exception is shown in Figure 6: peak torque and maximum Bhp are both obtained at around 16,000rpm. This Sport-Jett .46 engine is designed for speed events and for rpm close to 18,000; at these rpm, this engine fires an incredible 300 times per second.

Refer to Figure 3 for the MDS .46 ABC engine. Its peak torque is at 10,000rpm, and the prop that loads the engine to those rpm is the 10x9 APC (STD silencer). This prop is suitable for the engine but may not be suitable for the plane (find more information in the section on propellers).

• **Power loading** is another key characteristic—like wing loading—and it's a convenient way to relate model weight in ounces to the engine's cid. For example, a model that weighs 92 ounces and is powered by a .46 engine would have a power loading of:  $92 \div 0.46 = 200$  ounces cid.



**Figure 4.** Data from Dave Gierke's review of the RJL K.61 R/C engine (*Model Airplane News*, May 1995). Peak torque range is 9,000 to 12,000rpm.

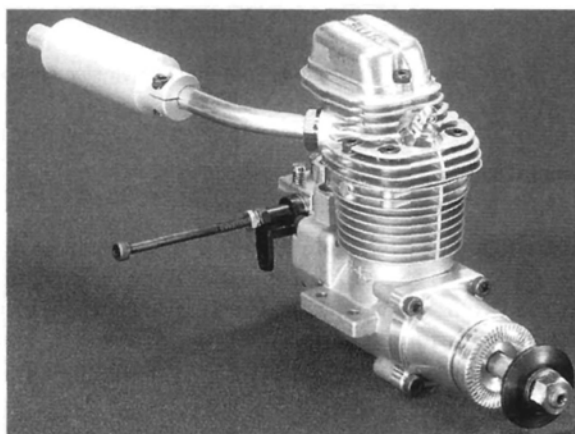


The power loading ranges given in Table 2 are self-explanatory and provide simple procedures for engine cid selection or model weights.

Power loading theory has one flaw: it suggests that all engines of a given cid would produce roughly the same power output. To explore this, our author found *Model Airplane News* engine reviews for 2-stroke and 4-stroke engines (see Tables 3 and 4).

Engines are listed in order of their cid, and each engine's max torque rpm and max torque in oz.-in. are shown. These figures do not tell us much until they are converted to Bhp, and then the results are very revealing. Ignore the Nelson AAC Q40 and Sport-Jett .46 for the moment (these are racing engines designed for very high rpm; the Nelson AAC Q40 engine is the Rolls-Royce of model engines). Note the variations in Bhp in the remaining popular .40- to .46- and .61-cid engines.

This accentuates the desirability of consulting these engine reviews before buying one. Unfortunately, many available engines have not been reviewed. The author faces this problem: five of his models are powered by O.S. Max .46 FS ringed engines with J'Tech in-cowl mufflers. This engine has never been reviewed; however,



Enya .41 rpm on standard propellers.

	Open exhaust	Standard muffler
14x7 Graupner	5,100	5,070
12x7 Master Airscrew	7,240	7,160
13x6 Top Flite	7,450	6,950
12x6 APC	8,690	8,540
10x9 APC	9,780	9,530
12x5 Graupner	9,790	9,740
11x6 Graupner	9,815	9,750
10x8 APC	10,740	10,562
10.5x6 Graupner	10,970	10,840
10x6 MK	11,080	10,790
10.5x6 Bolly Clubman	11,120	10,860
10x7 APC	11,560	11,270
10.5x6 Bolly Clubman	13,080	12,726
9.5x6 Bolly Clubman	13,740	13,344

Table 2. Power loading ranges.

Power loading (oz./cid)	Model performance
100 to 200	Highly maneuverable, out-of-sight climb
200 to 250	Good maneuverability, fair climbing ability
250 to 300	Trainers and slow flying models
300 and up	Glow-powered gliders
	Author's Dove (367 oz./cid)
	Butterfly with .10 engine (500 oz./cid)

#### Procedure

1. To find the model weight to use with an engine of known cid, select power loading above.  
Selected power loading x engine cid = weight (oz.)  
Example: 225 power loading x .61 cid = 138 oz.

2. To find engine size to suit model weight, select power loading above.  
Model weight ÷ Selected power loading = Engine cid  
Example: 92 oz. ÷ 200 power loading = .46 cid

Table 4. *Model Airplane News* reviews of 4-stroke engines.

Engine	Cid	Max torque (rpm)	Max torque (in./oz.)	Bhp	Issue
Enya 41-46	.41	10300	49	.50	Jan. 1997
Saito Fa 50	.50	11500	60	.68	Aug. 1993
O.S. FS 61	.61	9000	87	.77	Oct. 1984
Enya 80-46	.80	8000	105	.83	Sep. 1985
O.S. FS	.90	7200	144	1.02	Apr. 1985
Thunder Tiger F915	.91	6850	154	1.04	Feb. 1997
O.S. FS 120 Surpass	1.20	8333	296	2.44	Sep. 1992
Saito 150 SAAC	1.537	4993	253.5	1.25	May 1984

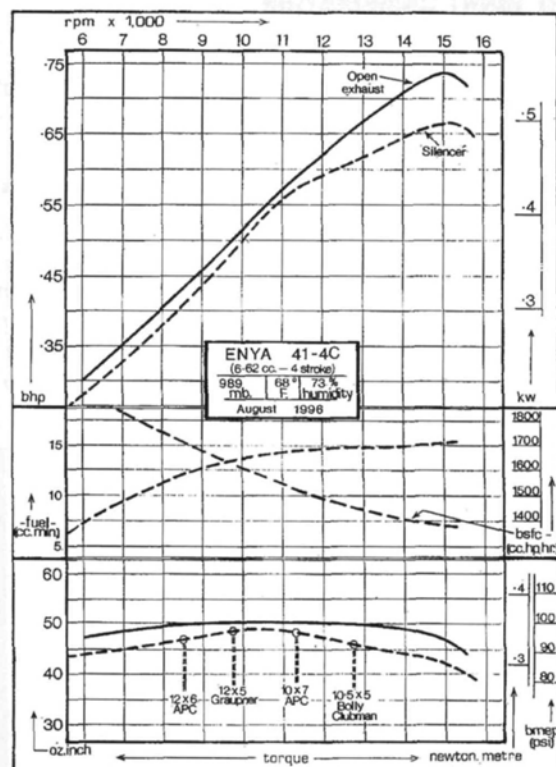


Figure 5. Data from Mike Billinton's review of the 4-stroke Enya .41 engine (*Model Airplane News*, January 1997).

Another surprise was how close the 4-strokes were in Bhp to 2-stroke engines of equal displacement. Their only disadvantage is that rpm above 11,000 are likely to damage the engines because of "valve float"—an ascending piston striking an open exhaust valve.

### WHICH PROPELLER TO USE

• Sources. The engine manufacturers recommend prop diameters and pitches for their engines; these may or may not be suitable for your model airplane.

This author has found that APC props are efficient and need little or no balancing. They are available in a very wide range of diameters and pitches for sport, pattern, pusher and pylon racing, and large 2-, 3-, or 4-blade props are available for big models.

#### Key characteristics. Note:

- An engine's high-torque rpm and prop pitches control MLF speeds.
- Propeller diameter and pitch control the engine's rpm to the high torque range. Diameter is more effective than pitch.
- For high speeds, smaller diameters and higher pitches are indicated.



## THE RIGHT COMBINATION

**Table 5. Characteristics of three models.**

Model	Weight (oz.)	Wing area (sq. in.)	Wing loading (oz./sq. ft.)	Est. speed (mph/rpm)	APC prop diameter x pitch	C <sub>L</sub>	Power loading (oz./cid)
Swift	.92	.600	.22	125*/1,200	10x9	.035	.200
Seahawk (land)	.110	.655	.24.3	100/10,500	11x8	.0625	.239
Robin	.110	.819	.19.4	75/9,200	12x7	.085	.239

\*Measured with an onboard maximum speed indicator, the Swift achieved 138mph in a normal 15-minute flight.

- For low speeds, larger diameters and lower pitches are indicated.

At this stage, two key factors are known: the engine's high-torque rpm, and the model's MFL speed. This leaves pitch and diameter to be determined.

To determine pitch, refer to Figure 7—the rpm/speed/pitch nomograph. This was developed from Dave Gierke's innovative in-flight data as shown in Figure 2.

Place a straightedge at the selected static rpm at the left and at the MLF speed in the center column, then read the required pitch in the right-hand column. For example, at 10,000rpm and 90mph, an 8-inch pitch is required.

To determine the most efficient diameter, if the engine has been reviewed and Bhp, torque curves and a table of rpm on standard props are available,

you are home free. Refer to Figure 5 and note that a 10x8 APC prop turns at 10,562rpm and that this rpm is at the peak of the engine's torque curve (with silencer). The extra 562rpm will do no harm!

If your engine has not been reviewed but you have a good idea of its high-torque range, obtain three or four propellers of the required pitch and of different diameters—say 9, 10, 11 and 12 inches for a .40 to .60 engine. Use a tachometer to measure the maximum static rpm of each prop on your engine. The prop with the diameter that most closely loads the engine to the desired high-torque rpm is the one to use.

You have now matched your airplane's characteristics to those of the engine, and you have selected

a prop whose diameter and pitch match the characteristics of both the plane and the engine—all to optimize the model's performance while being appropriate to your flying skills.

### PROOF

Table 5 contains statistics of three of the author's models. Although these are original designs, not kits, they reflect the matchmaking principles described in this article. All three are excellent flyers. When designing each one, my objectives were:

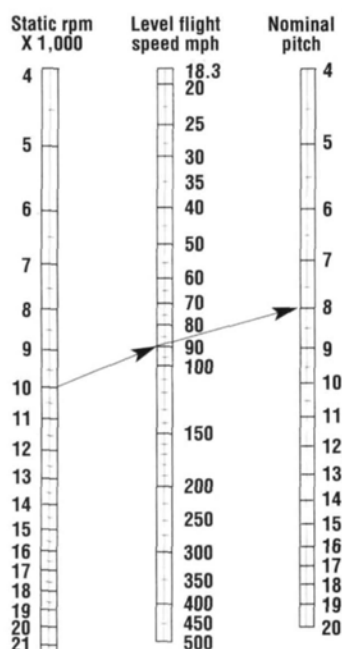
- *Swift*: speed (125mph) and maneuverability.
- *Seahawk*: convertible from tricycle land to single-float seaplane and a test bed for Youngman slotted flaps.
- *Robin*: sport tail-dragger; good aerobat; large for ease of visibility; it has surprisingly good short takeoff and landing (STOL) ability owing to its large slotted flaps.

Note that prop max rpm falls in the high-torque range of the O.S. Max .46 FS ringed engine of 9,000 to 12,000rpm. These models feature low drag and ducted engine cowls, stressed-skin structure, NASA "safe wing" drooped leading edges, and mass-balanced ailerons, elevator and rudder and slotted flaps.

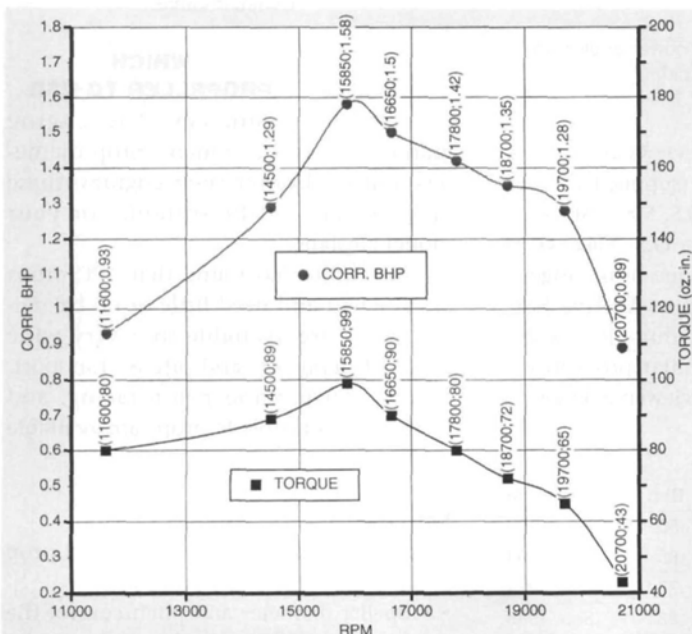
### CONCLUSION

Much of this article would not have been possible without the fine engine reviews by Mike Billinton, Peter Chinn, Dave Gierke and Clarence Lee.

Finally, a tribute to Marc Andre Brady, a young gentleman of 17 years and the author's chief test pilot. After only two flying seasons, he is the most talented and knowledgeable pilot it has been the author's pleasure to observe. He is supported by and is a credit to his parents, Jean Pierre and Lynn Brady, his flight instructors, Paul Rainville and Robert Aries, and to our model aviation club, "MAVIPs." ✈



**Figure 7.**  
Rpm/speed/pitch  
nomograph.



**Figure 6.** Data from Dave Gierke's evaluation of the Sport-Jett .46 engine (*Model Airplane News*, June 1999). Note that the torque and Bhp peak at 16,000 rpm. This is a racing engine.



**The following APC propellers produced the following rpm on the Sport-Jett .46:**

Prop	Rpm
9x7	17,500
9.5x6.5	17,000
10x6	16,700
9.5x7.5	16,500
10x7	15,300
11x5	15,000
10x8	14,300
12x6	10,500



# NAME THAT PLANE

*Can you identify this aircraft?*



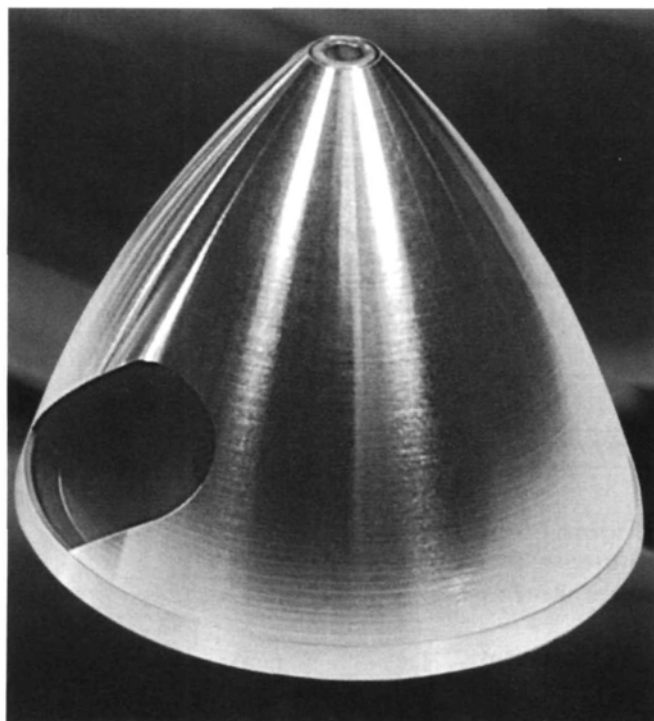
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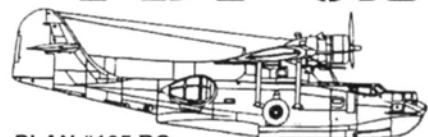
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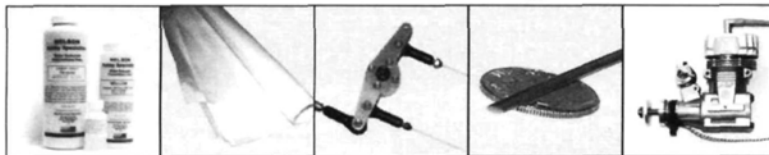
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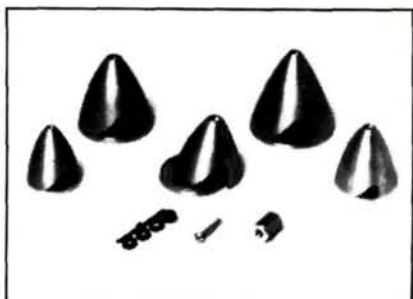
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## Millions discover RC

For more than three decades, the Westchester Radio Aero Modelers (WRAM) club has staged the East Coast's largest annual RC trade show during the last week of February. Held at the big Westchester County Center in White Plains, NY, the WRAM show is a perennial success, thanks to the hard work of the club's members.

In 1996, WRAM launched a program to promote the aviation modeling hobby by getting youngsters to participate. Toward that end, former WRAM president Hank Nielsen created the "Hat in the Ring Youth Aviation Program," so called to suggest adults "throwing their hats into the ring" to help kids. The name comes from the old 94th Fighter Squadron that began in the days of WW I flying ace Capt. Eddie Rickenbacker. The Hat in the Ring Squadron is still active today, but its members fly F-15 Eagles instead of Spads and Nieuports. The commander of the 94th was kind enough to permit the WRAM club to use both the squadron's name and its logo for the youth organization.

The program has continued to evolve over the past couple of years; it includes filmed and live-action demonstrations, a speakers' bureau, teaching aids, library grants



**Hank Nielsen, creator of the WRAM club's "Hat in the Ring Youth Aviation Program," holds a Wrampager. The full-size plan and detailed assembly instructions for this beginner's model are available on WRAM's website: [www.wram.com](http://www.wram.com).**



**Inside Westchester Airport, five RC models of up to 1/3 scale have been hung from the ceiling; this RC trainer hangs above the WRAM club's main display.**

and an Internet site. To raise funds to support these activities, Hank Nielsen enlisted the help of Gen. Chuck Yeager, the first pilot to break the sound barrier in level flight. Gen. Yeager lent his name to the program by autographing several scale models of the famous Bell X-1 rocket plane to sell at auction.

The WRAM club maintains an informative website ([www.wram.org](http://www.wram.org)) that describes the Hat in the Ring program and offers instructions and plans for building a basic training model called "the Wrampager." The balsa airplane can fly as an indoor, hand-launched glider with rubber-band power or outdoors with electric, CO<sub>2</sub> or Jetex solid rocket power. It can also be RC'd with

micro equipment. The instructions and full-size plans for the standard and sailplane versions are downloadable.

The WRAM club's efforts to promote airplane modeling went in a unique direction when its members approached Westchester County officials to see whether a model airplane display could be exhibited at the Westchester County Airport in White Plains, NY. More than a million travelers pass through the airport each year, and the WRAM members suggested that people who appreciate full-size aviation might like to experience the joys of RC model flight. The request was approved.

Currently, a prominently displayed 3x6-foot glass case contains promotional items and photos of model aircraft. An RC trainer plane has been hung directly over the display, and beautiful 1/4- and 1/3-scale RC models have been hung from the ceiling at various spots throughout the airport. A second display case containing various RC equipment—along with explanations for its use—will also soon be added.



**A small collection of Bell X-1 scale models autographed by Gen. Chuck Yeager is being auctioned off to raise funds for the "Hat in the Ring" program.**



**On the observation level of the Westchester County Airport in White Plains, NY, the WRAM club's display promotes aviation modeling to more than a million travelers every year.**